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UNIVERSITY OF ALBERTA

# THE STAGES AND PROCESSES OF CHANGE RELATED TO PARTICIPATION IN PHYSICAL ACTIVITY

BY

CAROL A. HILLS

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment of the requirements for the degree of MASTER OF ARTS

IN

RECREATION

DEPARTMENT OF RECRECREATION AND LEISURE STUDIES

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## ABSTRACT

An important concern in the health psychology field has been to understand the factors associated with behavior change in order to promote the adoption of healthy lifestyle practices. The study of behavior change in the area of exercise is important as regular involvement in physical activity has been associated with a wide variety of physiological and psychological benefits.

One model that has been used to study behavior change in a variety of health-related behaviors is the Transtheoretical Model (Prochaska & DiClemente, 1984). The Transtheoretical Model explains behavior change as involving the use of ten distinct processes of change, namely conscoiusness raising, counterconditioning, dramatic relief, environmental reevaluation, helping relationships, reinforcement management, self-liberation, self-reevaluation, social liberation and stimulus control, across five stages of change, namely precontemplation, contemplation, preparation, action and maintenance.

The purpose of this study was to assess the frequency of use of the model's ten processes of change with individuals representing each of the stages of change with respect to the adoption and maintenance of physical activity. The subjects of this study were 407 employees of a large urban medical centre. This investigation employed a cross-sectional mail survey in which each subject received a questionnaire that assessed his/her stage of change, frequency of use of the processes of change, self-reported frequency, duration and intensity of exercise, and demographic variables including gender, age, occupation classification, and work schedules.

The use of the experiential processes of change-consciousness raising, environmental reevaluation, self reevaluation, and social liberation- increased from precontemplation to contemplation to preparation and peaked in the action stage. Use

of the behavioral processes-counterconditioning, reinforcement management, self liberation, stimulus control and helping relationships-also increased across the stages of change and continued to be frequently used in maintenance. Recommendations for future research based upon the results of this study are provided.

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## LIST OF SYMBOLS AND ABBREVIATIONS

### Symbols

| | | | |
|---|---|---|---|
| n | Number in Sample | $\chi^2$ | Chi Square |
| p | Probability | $\bar{x}$ | Mean |
| D.F. | Degrees of Freedom | | |

### Abbreviations

| | |
|---|---|
| PC | Precontemplation Stage of Change |
| C | Contemplation Stage of Change |
| P | Preparation Stage of Change |
| A | Action Stage of Change |
| M | Maintenance Stage of Change |
| CR | Consciousness Raising |
| CC | Counterconditioning |
| DR | Dramatic Relief |
| ER | Environmental Reevaluation |
| HR | Helping Relationships |
| RM | Reinforcement Management |
| SEL | Self Liberation |
| SR | Self Reevaluation |
| SOL | Social Liberation |
| SC | Stimulus Control |

# CHAPTER 1

# INTRODUCTION

## Rationale for the Study

An important concern of the health psychology field has been to understand the factors associated with behavior change in order to promote the adoption of healthy lifestyle practices. The study of behavior change in the area of exercise is important as regular involvement in physical activity has been associated with a wide variety of physiological and psychological benefits (Bouchard, Shephard, Stephens, Sutton & McPherson, 1990). However, despite the benefits of regular physical activity involvement, significant numbers of individuals remain sedentary, and of those who do begin physical activity programs, typically 50% drop out within the first three to six months (Dishman, 1991; Martin & Dubbert, 1982).

The adoption and maintenance of health behaviors involves complex processes and may be understood as a sequence of stages in which different processes are applied over time (Horn, 1976; Marlatt & Gordon, 1985; Prochaska & DiClemente, 1982, 1984). One stage-based model of change that has been applied to health related behaviors is the Transtheoretical Model of Behavior Change (Prochaska & DiClemente, 1984).

Prochaska and DiClemente (1984) developed the Transtheoretical Model to assist in understanding how people change their behaviors on their own or in therapy. The model emerged from a recognition that psychotherapy was becoming increasingly divergent and that there was a need for greater integration. The Transtheoretical Model represents an attempt to move toward a more comprehensive model of change (Prochaska & DiClemente, 1984). It explains behavior change as involving the application of ten processes of change across five stages of change. The "stage x process" model developed out of research on smoking cessation (Prochaska & DiClemente, 1982, 1983, 1984, ), but has been applied to a variety of other health

related behaviors including weight control, psychological distress, and exercise acquisition (Prochaska & Marcus, in press).

Several researchers in the exercise adherence field advocate the application of a stage approach to studying the adoption and maintenance of regular physical activity (Dishman, 1991; Sallis & Hovell, 1990). The Transtheoretical Model is one such model that has been suggested as being useful in understanding behavior change concerning exercise involvement (Prochaska & Marcus, in press).

**Statement of the Problem**

The purpose of this study was to investigate the utility of the Transtheoretical Model for understanding the adoption and maintenance of physical activity . In particular, the usefulness of the Transtheoretical Model's stages and processes of change in understanding the dynamic nature of the behavior change process in the area of physical activity was studied.

**Objectives of the Study**

The following hypotheses were investigated:

1) Individuals will be classified into one of five stages of change, namely Precontemplation, Contemplation, Preparation, Action and Maintenance, in adopting and maintaining physical activity.

2) Individuals will employ ten processes of change, namely consciousness raising, dramatic relief, environmental reevaluation, social liberation, self-reevaluation, counterconditioning, helping relationships, reinforcement management, stimulus control and self-liberation, in adopting and maintaining physical activity.

3) The ten processes of change will be differentially applied across the stages of change in the following manner:

(a) Each of the ten processes of change will be used infrequently during the Precontemplation stage.

(b) Consciousness raising, dramatic relief, environmental reevaluation, social liberation, self-reevaluation will be used to the same extent by those in Preparation and Contemplation.

(c) Counterconditioning, reinforcement management, and self-liberation will be used more by those in Preparation than those in Contemplation.

(d) All processes will be used more in Action than in Precontemplation, Contemplation, or Preparation.

(e) There will be no difference in the frequency of use of helping relationships, stimulus control, counterconditioning, reinforcement management and self-liberation by those in the Action and Maintenance stages.

(f) Consciousness raising, dramatic relief, environmental reevaluation, social liberation and self-reevaluation will be used less frequently by those in Maintenance than by those in Action.

**Operational Definition of Terms**

To ensure consistency and clarity throughout this study, several terms warrant further explanation.

1. Exercise: Throughout this study, exercise and physical activity are used interchangeably. Both of these terms are used to refer to physical activity that is

"purposive in the sense that improvement or maintenance of one or more components of physical fitness is an objective" (Caspersen, Powell, Christenson, 1985, p.128).

2. Regular Exercise: Throughout this study, regular exercise is defined as participating in exercise three or more times per week for at least twenty minutes each time.

3. Stages of Change: In the process of behavior change, individuals progress through a series of stages. A stage is both stable and dynamic, falling between stable traits and dynamic states (Prochaska & Marcus, in press). Progression through the stages is not linear, but rather cyclical in nature. Individuals may both progress and regress through the stages several times before successful behavior change occurs. As well, an individual may remain at certain stages for considerable time periods, but the potential for change still exists (Prochaska & Marcus, in press). Five stages have been identified and defined in terms of both intentions about future behavior changes and current behavior: The stages of change in the area of exercise are defined as follows:

(a) *Precontemplation:* Individuals who are currently sedentary and who have no current plans to make regular exercise part of their lifestyle in the near future (next six months).

(b) *Contemplation:* Individuals who are currently sedentary but who are planning to initiate regular physical activity in the near future (within six months).

(c) *Preparation:* Individuals who intend to take action in the near future (within the next month) and may have made some behavior changes (some increase in exercise levels but not exercising on a regular basis).

(d) *Action:* Individuals who have initiated and have maintained regular exercise within the last six months.

(e) *Maintenance:* Individuals who have maintained regular involvement in exercise for six months or more.

4. Processes of Change: In undergoing behavior change, individuals employ a number of covert and overt strategies and techniques. These strategies and techniques comprise the processes of change. To date, ten processes of change have been identified and defined in terms of exercise behavior as follows (Marcus et al., 1992, p.425):

(a) *Consciousness Raising:* Efforts by the individual to seek new information and to gain understanding and feedback about remaining sedentary. This process involves increasing one's awareness regarding the defenses that are used against becoming physically active as well as gaining information regarding the outcomes of sedentary behavior.

(b) *Counterconditioning:* Substitution of alternative behaviors for remaining sedentary. This process involves changing the way one thinks and feels about activity and inactivity.

(c) *Dramatic Relief:* Affective aspects of change, often involving intense emotional experiences related to remaining sedentary. This process involves that cathartic release of emotions and anxiety that may be evoked when considering the health hazards of inactivity.

(d) *Environmental Reevaluation:* Consideration and assessment by the individual of how remaining sedentary affects the physical and social environment.

(e) *Helping Relationships:* Trusting, accepting, and utilizing the support of caring others during attempts to begin and maintain exercise.

(f) *Reinforcement Management:* Changing the contingencies that control or maintain being sedentary. This involves providing rewards for being active, and removing rewards for being sedentary

(g) *Self-Liberation:* The individual's choice and commitment to change, including the belief that one can change. The individual recognizes that he/she has the ability to choose whether to be active or not., and accepts the responsibility associated with that choice.

(h) *Self-Reevaluation:* Emotional and cognitive reappraisal of values by the individual with respect to being inactive. The individual reevaluates how he/she thinks and feels about the outcomes of a sedentary lifestyle.

(i) *Social Liberation:* Awareness, availability and acceptance by the individual of alternative, problem-free life-styles in society. The individual recognizes that leading an active lifestyle is an acceptable alternative.

(j) *Stimulus Control:* Control of situations and other causes which trigger inactivity. This involves both increasing cues for exercise, and decreasing cues for sedentary behavior.

**Delimitations**

This study was conducted using a random sample of staff of a large medical institution. The results of this study are based upon data collected from adults employed in an urban area. The study was cross-sectional in nature and was collected through a mail survey. As well, this study attempted to replicate previous findings therefore scales developed for past studies were used for data collection.

**Limitations**

The participants of this study were chosen based upon a staff list supplied by the medical institution, therefore it included only those employees accessible through

the personnel department of the institution. As a result, one large segment of those who work within the institution, namely the physicians, were excluded from the results of this study.

The results of this study were based solely upon self-report data therefore error in memory, recall or biased reporting may have influenced the subjects' responses.

# CHAPTER 2

# REVIEW OF THE LITERATURE

There has recently been a shift in perspective in the definition of health. Health has previously been defined as the absence of disease. However, with the rising costs of health care, an increased emphasis is being placed upon broader perspectives of health that incorporate health enhancing initiatives rather than only remedial health care initiatives. Health is now viewed from a more holistic perspective. Health is seen as a resource that not only assists in disease prevention, but enhances quality of life through physical, mental, and emotional well-being(Health and Welfare Canada, 1989/90). One aspect of this new focus of health is the importance of healthy lifestyle behaviors and their influence on individual well-being.

A variety of lifestyle behaviors have been associated with disease prevention and health enhancement. One such behavior is regular involvement in physical activity. An active lifestyle has been linked to both physical and psychological benefits (Bouchard et al, 1990). Despite the potential benefits that may be derived from involvement in physical activity, significant numbers of individuals remain sedentary. In the past 15 years in Canada, the prevalence of sedentary leisure time has remained at 30%-60%, whereas only about 25% of Canadians are thought to be highly active (Stephens, Craig & Ferris, 1986). In addition, it has been reported that of those who do begin participation in physical activity, relatively few persist. Typically, 50% of individuals who begin an exercise program discontinue within six months of initial involvement (Dishman, 1991).

In order to assist individuals in receiving the potential health enhancing benefits of an active lifestyle, it is important to understand the factors that facilitate and reinforce the adoption and maintenance of physical activity participation.

Research to date that has been undertaken in attempts to understand exercise participation has included research regarding the determinants of physical activity participation, interventions to facilitate physical activity participation, and the development of psychological models of physical activity involvement.

**Determinants of Physical Activity Participation**

Research conducted on the determinants of physical activity has attempted to explain and predict physical activity participation in both structured and unstructured settings. The determinants of physical activity involvement have been defined as correlates of, or those factors associated with, participation in physical activity.(Sallis & Hovell, 1990). Knowledge of physical activity determinants not only assists in understanding exercise behavior but also may assist in designing interventions to support physical activity participation. According to Dishman (1988), determinants "help explain why current activity patterns exist and can specify what must likely be changed to alter them"(p. 90). A variety of physical activity determinants have been studied. These determinants include personal attributes, environmental factors, and characteristics of physical activity (Dishman 1991, 1990).

Determinants that may be categorized as personal attributes consist of those variables that originate from or reside within the individual (Dishman, 1990). A number of personal attributes have been associated with physical activity participation. These variables include demographic characteristics, physical factors, activity history, personality traits, and other psychological factors.

Several demographic variables have been consistently related to physical activity participation. These variables include education, income, occupational status, gender and age. Those of higher educational and income levels and occupational status tend to be more active. There is little difference in total activity between men and women, however, men tend to be involved in more vigorous physical activity

than women. In addition, age has been found to be negatively associated with physical activity participation (Willis & Campbell, 1992; Wankel, 1988).

Several physical factors have been studied as determinants to physical activity involvement. These characteristics have included body weight, higher percentage of body fat, height, blood pressure, cholesterol and triglycerides, level of fitness, circulatory disability, and low metabolic tolerance. In general, these factors have not been shown to predict physical activity participation in any consistent manner (Willis & Campbell, 1992; Dishman, 1991,1990).

Activity history has also been studied as a physical activity determinant. Past participation in adulthood has been associated with physical activity involvement (Dishman, 1991; 1990). In a study conducted by Kruse & Calden(1986), level of activity just prior to subjects receiving a physical fitness evaluation and an exercise prescription, was the best predictor of level of activity at follow-up. Those who were most active at follow-up were those who were most active before the evaluation. The relationship between present participation and past participation in childhood has also been studied, but is less clear (Dishman, 1991, 1990). According to Dishman (1990), "although childhood sport experience can be an agent in socializing adult roles, it can also be overridden by other personal and environmental influences that exert a more immediate effect in adulthood"(p. 82).

A number of psychological traits and other cognitive variables have also been studied as determinants of physical activity participation. Psychological traits such as perceived mood disturbance, the aggressive and time conscious Type A personality, and self-motivation have been associated with physical activity involvement. Those with mood disturbances and characterized as a Type A personality have been found to be less likely to be active, while self-motivated individuals appear to be more likely to be engaged in physical activity (Dishman, 1991, 1990). However, according to Willis & Campbell (1992), "results of studies on other personality traits as predictors of

exercise adherence tend to be conflicting or inconclusive" (p.27). In addition to personality traits, a variety of psychological factors including self-efficacy (Ewart et al, 1983; Sallis et al, 1986), self schemata (Kendzierski, 1988), perceived control, knowledge, attitudes, beliefs, and intentions (Dzewaltowski, Noble & Shaw, 1990; Godin & Shephard, 1986) have been positively associated with physical activity participation. These cognitive variables offer promise to more precisely predict physical activity involvement as they can account for variability across population segments, time periods, and settings (Dishman, 1990).

Although many of these factors have been associated with physical activity participation, consideration of psychological variables and personal attributes alone appear to be inadequate for explaining and predicting participation in physical activity(Sallis & Hovell, 1990). Factors in the environment, or variables external to the individual, have also been associated with physical activity involvement. These factors include variables such as convenience, social support, and work demands. Two interrelated aspects of convenience are location convenience and time convenience. Wankel (1985) found that perceptions of location and time convenience differed among exercise program dropouts and participants, with more dropouts than adherers indicating inconvenient time and location as factors disliked about the program. Both perceived facility convenience and actual proximity of facilities to residences or workplaces have been positively associated with participation in physical activity (Gettman, Pollock, & Ward, 1983). However, one of the most prevalent reasons given for being inactive or dropping out of physical activity participation is lack of time (Dishman, Sallis & Orenstein, 1985; Martin & Dubbert, 1985). Rather than being a true barrier, lack of time may reflect the existence of poor behavioral skills such as time management skills, or a rationalization for lack of motivation or commitment to be active as regular exercisers have been found to be as

likely, and even more likely, to view time as a barrier as non-exercisers (Dishman, 1990; Wankel, 1987).

Social support from significant others has also been positively associated with being active. Family, spousal, and peer social support have all been found to be important factors in participation in physical activity (Wankel, Yardley, & Graham, 1989; Wankel, 1985; Oldridge et al., 1983; Heinzelmann & Bagley, 1970).

Work demands are also an important factor that influence participation in physical activity. These demands include " travel, physically demanding work, frequent meetings, long hours, and demanding supervisors" (Willis & Campbell, 1992, p.31). Conflicts with work schedules has been identified as a reason for dropping out of cardiac rehabilitation programs (Andrew, Oldridge, Parker, Cunningham, Rechnitzer, Jones, Buck, Kavanagh, & Shephard, 1981) and in studies of healthy adults (Gettman, Pollock & Ward, 1983). Lack of supervisor support has also been identified as a barrier to corporate fitness program participation (Adams & Landgreen, 1988).

Characteristics of the physical activity program itself are also important in enabling or impeding physical activity involvement. In particular, program social support, enjoyment and perceived choice have been found to be positively associated with involvement in physical activity (Wankel, 1985; Thompson & Wankel, 1980). Mixed results have been reported regarding the relationship between intensity of activity and physical activity participation. Intensity of the physical activity experience and perceived effort have been found to be negatively associated with participation, in some studies (Dishman, 1990; Pollock, 1988), but not in others (Shephard, Morgan et al., 1980).

A variety of variables have been associated with physical activity participation. The majority of studies investigating exercise determinants are not experimental in nature, therefore these studies demonstrate an association rather than

causes of physical activity involvement. As well, many of the studies involve specific programs or populations rather than representative population samples (Sallis & Hovell, 1990) Physical activity participation is a complex behavior that is influenced by a number of different variables both within and external to the individual. Characteristics of the individual, the environment, and the activity need to be taken into consideration in attempts to understand and predict involvement in physical activity (Sallis & Hovell, 1990). Also, studies investigating the determinants of physical activity have not taken into consideration the process of exercise acquisition and maintenance. Sallis and Hovell (1990) suggest that the determinants of participation are likely to be different for the various transition points in the process of physical activity involvement. They suggest that the determinants of adopting exercise are not necessarily the same as those involved in the maintenance of physical activity participation or in resuming involvement after dropping out. The majority of research in the exercise determinants literature has focused upon the maintenance of activity and has neglected studying aspects related to the adoption or resumption of physical activity participation. Sallis and Hovell (1990) suggest that "contrasting the relative strengths of environmental, social, cognitive, and physiological variables on the adoption, maintenance, and resumption of exercise may provide information that will help in the design of appropriate interventions" (p. 323).

**Physical Activity Interventions**

A number of interventions have been studied in attempts to enhance physical activity involvement. These interventions have included behavior modification techniques and cognitive behavior modification techniques such as cueing (Brownell, Stunkard, & Albaum, 1980) , structured social support(Wankel, Yardley & Graham, 1985;), reinforcement (Perkins, Rapp, Carlson, Wallace, 1986; Weber & Wertheim, 1989; Kravitz & Furst, 1991), self-control training (King, Taylor, Haskell, &Debusk,

1988; Welsh, Labbe, & Delaney, 1991), contracting(Oldridge & Jones, 1983; Neale, Singleton, Dupuis, & Hess, 1990), goal-setting(Alexy, 1985; Dolce, Crocker, Moletteire, & Doleys, 1986), decision making (Wankel, Yardley, & Graham, 1985; Lock, 1990), and counseling(Long & Haney, 1986; Belisle, Roskies, & Levesque, 1987; King, Taylor, Haskell, & Debusk, 1988). Many of these interventions have been found to result in enhanced physical activity. As well, health-education approaches have been shown to increase involvement in physical activity by individuals of diverse age and fitness levels (Godin & Shephard, 1983).

Studies of interventions to enhance physical activity participation have measured physical activity involvement and adherence in many ways with the frequency of exercise behavior being the most common dependent variable. The magnitudes of the effects of the interventions studied to date range from 10% - 35%. The effects of interventions on other aspects of physical activity participation (i.e., intensity, duration) are less clear. The majority of intervention effects have been considered only over a relatively short period of time (3 weeks to 6 months). Those studies that do include follow-up data longer than six months report the resulting increases in physical activity diminishing once the interventions are removed. The majority of studies investigating the effects of interventions upon involvement in physical activity have utilized individual behavior change techniques with small, homogeneous, groups of individuals in physical activity programs or in structured settings. Recently, studies have included subjects with more diverse backgrounds, incorporated more community-based interventions, and investigated the effects of the interventions upon non-structured, home-based activity (Owen, Lee, Niccarella, & Haag, 1987; King , 1991; Dishman, in press).

Although a number of intervention strategies enhance physical activity involvement, no one intervention or combination of interventions have been found to be consistently superior to others, or effective for all individuals (Dishman, 1991;

Wankel & Hills, in press). It has been suggested that in order to improve the effectiveness of interventions to enhance physical activity involvement, more theory-based research is required, and that intervention strategies need to take into consideration the various stages of participation in physical activity, namely planning, adopting and maintaining physical activity involvement (Dishman, 1990; 1991; Martin & Dubbert, 1985).

**Psychological Models of Physical Activity Involvement**

To date, research on physical activity determinants and interventions has been largely atheoretical. It has been suggested that there is a need for more theory-based research in attempts to understand physical activity participation.

A number of psychological models have been employed in attempts to understand participation in physical activity . These models include the health belief model (Rosenstock, 1974; Becker, 1974), the theory of reasoned action (Fishbein & Ajzen, 1975), the theory of planned behavior (Ajzen, 1985, 1987), social cognitive theory (Bandura, 1986), and the psychological model of physical activity participation (Sonstroem, 1978; 1988; Sonstroem & Morgan, 1989). Each of these models encompass aspects of physical activity participation, however, they are static in nature in that involvement in physical activity is treated as a dichotomous, all-or-none variable. The dynamic, continuous process of behavior change has not been taken into consideration(Dishman, 1982; Sonstroem, 1988). Process oriented theories of behavior change may provide further guidance in identifying individual differences that facilitate or inhibit physical activity participation, and in matching interventions to these differences in order to improve their effectiveness. One model that considers the dynamic nature of the change process and that has been suggested as being useful in understanding physical activity participation is the Transtheoretical Model of Behavior Change (Dishman, 1991; Sonstroem, 1988).

## The Transtheoretical Model

The Transtheoretical Model was developed to assist in understanding the dynamic process of behavior change (Prochaska & DiClemente, 1984). The two core components of the model are the stages of change and the processes of change. The model explains behavior change as involving five stages of change in which ten processes of change are differentially applied. This stage by process model developed out of research on smoking cessation (Prochaska & DiClemente, 1982,1983,1984), but has been applied to a variety of other health-related behaviors including weight control (Prochaska et al., 1992), psychological distress (Norcross & Prochaska, 1986), and exercise acquisition (Marcus et al, 1992) .

### Stages of Change

One of the core concepts of the Transtheoretical Model is that change occurs through a series of stages (Prochaska & DiClemente, 1984). The stages of change were first identified by Daniel Horn (1976). He reviewed research on the development and maintenance of smoking habits among youth and adults. Through this review, Horn recognized that the initiation and maintenance of the smoking habit involved different elements. He identified four stages of change that characterized the smoking habit, namely: (1) Contemplation to change; (2) Decision to change; (3) Short-term change; and (4) Long-term change. Horn proposed that these stages would be applicable to all personal choice health behaviors, or behaviors involving a decision regarding the costs and benefits of undertaking the behavior. He defined these behaviors as those "comprising normal, socially acceptable ways of increasing the enjoyment of life or providing mechanisms for coping with the problems of life"(Horn, 1976, p.90). Horn further stated that these behaviors "share the characteristic that when carried beyond a certain point or when they occur at inappropriate times...they create problems, either health problems or social problems for the individual, the people around him, or for society at large"(Horn, 1976, p.90).

He identified drug abuse, eating habits, sex behavior, alcohol use, and physical risk taking (hazardous sports) as examples of such behaviors.

The stages of behavior change were also identified by Prochaska and DiClemente (1982). They conducted retrospective interviews of smokers who successfully stopped smoking on their own and smokers who stopped smoking through structured treatment programs. In a pilot study for this research, the subjects identified the change process in terms of stages similar to those identified by Horn (1976). In Prochaska and DiClemente's study, the subjects differentiated four stages: (1) Thinking about stopping; (2) Becoming determined to stop; (3) Actively modifying their habits and/or environment; and (4) Maintaining their new habit of not smoking. The stages were found to represent distinct but related periods of time that seemed to be marked by different types of activities. Prochaska and DiClemente(1982) renamed the stages as Contemplation, Determination (Decision Making), Action, and Maintenance.

In an attempt to investigate the relevance of these stages to other behaviors, McConnaughy, Prochaska, and Velicer (1983) developed a stages of change questionnaire. The questionnaire was distributed to 155 subjects, adult outpatients with a broad range of clinical problems who were attending a community facility, private therapist, military counseling center, or university campus counseling center for therapy. The four previously identified stages of change were included in the study as well as a "Precontemplation" stage that was identified from clinical work with more resistant clients. Items for each of the five stages were generated and were judged by three evaluators. The evaluators attempted to identify which stage each item was to measure. Only those items that all three evaluators agreed upon were retained for the instrument. The original instrument consisted of 125 items defining each of the five stages, however, a principal component factor analysis resulted in the retention of just 32 items pertaining to four stages of change, Precontemplation,

Contemplation, Action and Maintenance. Decision Making did not emerge as an independent and distinct stage, but rather these items loaded on both the Contemplation and Action stages. Adjacent stages were found to be more highly correlated than non adjacent stages. According to the authors, this suggested a predictable movement through the stages.

McConnaughy, DiClemente, Prochaska, and Velicer (1989) conducted a study in an attempt to replicate and cross-validate the stages of change scales. The subjects for this research were 327 adult outpatients, largely individuals with serious psychiatric disturbances, attending the Texas Research Institute for Mental Sciences for therapy. This study replicated the original findings of the existence of four distinct stages of change, Precontemplation, Contemplation, Action, and Maintenance. The finding of the original study that adjacent stages were more highly correlated than non adjacent stages was also replicated.

The stages of change model has also been confirmed by assessing the stages in terms of a classification schema based on attitudes and behaviors regarding change of a target behavior (DiClemente, Prochaska, Fairhurst, Velicer, Velasques, & Rossi, 1991). This classification schema defines the stages as follows:

(1) Precontemplation: Not considering changing the target behavior (i.e., quitting smoking).

(2) Contemplation: Smoking, but seriously considering quitting within the next six months.

(3) Preparation: Seriously considering quitting within the next six months and planning to quit within the next 30 days.

(4) Action: Quit smoking within the past six months.

(5) Maintenance: Quit smoking and been abstinent for at least six months.

The construct validity for defining the stages in terms of attitudes and behaviors has been demonstrated in that the stage classifications have been

consistently related to the processes of change(Ahijevych & Wewers, 1992; DiClemente et al., 1991; Prochaska & DiClemente, 1983), decision making (DiClemente et al., 1991; O'Connell & Velicer, 1988; Velicer, DiClemente, Prochaska & Brandenburg, 1985), and self-efficacy (DiClemente et al., 1991; DiClemente, Prochaska, & Gibertini,1985).

In addition, there is some evidence for the predictive utility of the stage model. In a study of smoking cessation, DiClemente et al. (1991) found, over a six month post-test period, that 25% of the individuals in the Precontemplation stage and 48% in the Contemplation stage were able to move ahead, take action and attempt to quit smoking. They also found that subjects who were classified in the Preparation stage entered the Action stage with greater frequency and success than those in Precontemplation or Contemplation, with the largest number of individuals (80%) having made a 24-hour quit attempt over the six months.

Marcus, Selby, Niaura, and Rossi (1992) have developed scales to measure the stages of change for exercise. A four item measure, using a five point Likert scale (1=strongly disagree to 5=strongly agree) to rate each item, was developed. The stages were initially defined as follows:

(1) Precontemplation: I currently do not exercise and I do not intend to start exercising in the next six months.

(2) Contemplation: I currently do not exercise but I am thinking about starting to exercise in the next six months.

(3) Action: I currently exercise some, but not regularly.

(4) Maintenance: I currently exercise regularly.

(5) Relapse: I have exercised regularly in the past, but I am not doing so currently.

Regular exercise was defined as participating in exercise three or more times per week for at least twenty minutes each time. Subjects were placed into the stage that they endorsed most strongly. If subjects did not agree or strongly agree with any of the items, they were not classified into a stage. In the first study investigating the application of this measure, many of the subjects clustered into the Action and Maintenance stages and therefore were not evenly distributed along the continuum. As well, Relapse did not emerge as a distinct stage. As a result, the measure was revised by deleting the relapse stage, including a Preparation stage, and incorporating time referents into the definitions of the Action and Maintenance stages. The Preparation stage was measured by the statement " I currently exercise some but not regularly", Action by "I currently exercise regularly, but I have only begun doing so within the last six months", and Maintenance by "I currently exercise regularly, and have done so for longer than six months". The time demarcation between Action and Maintenance was consistent with that established in smoking cessation(DiClemente et al., 1992; Prochaska et al., 1988; DiClemente & Prochaska, 1985) and that established in the exercise adherence literature as the time period beyond which dropout rates decrease substantially (Dishman, 1984).

This measure more clearly differentiated the subjects and its reliability over a two-week period was demonstrated (Kappa index=.78). In both studies however, 7% of the sample could not be classified into a stage due to the pattern of responding. Marcus et al. (1992) suggested that further measures should include a yes/no format or a scoring algorithm so that all subjects could be classified into a stage.

The stages of change questionnaire was modified by Marcus, Eaton, Rossi, and Harlow (in press). The stages were measured using an 11 point scale in the shape of a ladder. Respondents were asked to pick the rung of the ladder that most accurately described their current exercise behavior. Each rung was numbered, and five of the rungs had written labels corresponding to the stages of change.

Respondents could pick rungs that were not labeled, but were classified into the closest stage for which they met the minimum requirements. In responding to this measure, 68% of the subjects selected one of the five labeled rungs. Based on this, it was suggested that the ladder could be shortened in future studies.

The construct validity of the stage of change measure for exercise has been established in that is has been consistently related to the processes of change (Marcus, Rossi, Selby, Niaura, & Abrams, 1992); decision making and self-efficacy (Marcus & Owen, 1992; Marcus, Rakowski & Rossi, 1992; Marcus, Eaton, Rossi & Harlow, in press; Marcus, Selby, Niaura & Rossi, in press). As well, Marcus and Simkin (in press) demonstrated the concurrent validity of this measure by its association with the Seven Day Physical Activity Recall Questionnaire. The results of this study revealed that individuals in the Action/Maintenance stages reported more moderate and vigorous physical activity compared to subjects in the Precontemplation/ Contemplation stages, and more vigorous physical activity compared to those in the Preparation stage. Therefore, levels of self reported physical activity corresponded with the reported stages of change in exercise behavior.

In addition, initial evidence for the predictive utility of the stages of change measure for exercise has been demonstrated. In a study of employees from four worksites, Marcus, Eaton, Rossi, and Harlow (in press) assessed their stages of change using the 11-point ladder scale and level of physical activity using the self-administered seven day physical activity recall questionnaire. Stage of change predicted 24% of the variance in vigorous and moderate levels of physical activity over a period of six months.

**Processes of Change**

The processes of change are defined as the "covert and overt activities that individuals use to modify problem behaviors" (Prochaska et al., 1988, p.520). In searching for common processes that effective therapies share, Prochaska (1979) completed a comparative analysis of eighteen major theories of psychotherapy. In doing so, he identified five common processes of change. Prochaska grouped these processes into three verbal and two behavioral therapies. The verbal processes included consciousness raising, catharsis, and choosing, and the behavioral processes were identified as conditional stimuli and contingency control. According to Prochaska, each of these processes could be applied at the experiential and environmental levels producing ten common processes of change in total (Table 1).

TABLE 1
Processes of Change

| | Experiential | Environmental |
|---|---|---|
| Consciousness Raising | Feedback | Education |
| Conditional Stimuli | Counter-conditioning | Stimulus Control |
| Catharsis | Corrective emotional experience | Dramatic Relief |
| Choosing | Self Liberation | Social Liberation |
| Contingency Control | Reevaluation | Contingency Management |

Prochaska (1979) stated that by integrating both experiential and environmental processes, a more balanced view of behavior change is provided as an individual's inner change potential as well as environmental limits on change are considered. These ten processes of change were not assumed to be exhaustive, but rather they provided a starting point for the development of the Transtheoretical Model (Prochaska & DiClemente, 1984).

The processes of change were investigated further in a large scale smoking cessation study of 970 self changers from Texas and Rhode Island(Prochaska & DiClemente, 1984 ; DiClemente & Prochaska, 1985; Prochaska et al., 1988). In this study, contingency control was subdivided into two components. The cognitive component, cognitive structuring, involved self-reevaluation at the experiential level, and social reevaluation at the environmental level. The behavioral component, contingency management, was further divided into self-management at the experiential level, and social management at the environmental level. As well, the therapeutic or helping relationship was included to determine if it was a separate change process. Thus in this study, thirteen processes of change were analyzed. Five items were selected to represent each of the processes by four trained judges. Respondents rated each item in terms of its frequency and importance to them using five point Likert scales. The analyses, including principal component analysis, yielded ten independent processes of change and resulted in a forty-item paper and pencil questionnaire to measure these processes. The feedback and education scales combined into one component, consciousness raising, suggesting that self-changers did not discriminate between experiential and environmental levels for this process. Self-reevaluation and corrective emotional experience also combined to form a single self-reevaluation component involving both affective and cognitive aspects. In addition, the helping relationship emerged as a separate change process. The resulting ten processes of change have been defined as follows (Prochaska et al, 1992, p.37):

Consciousness Raising: Increasing information about self and problem.

Counterconditioning: Substituting alternatives for problem anxiety related behaviors.

Dramatic Relief: Experiencing and expressing feelings about one's problems and solutions.

Environmental Reevaluation: Assessing how one's problems affect physical environment.

Helping Relationships: Being open and trusting about problems with someone who cares.

Reinforcement Management: Rewarding oneself or being rewarded by others for making changes.

Self-Liberation: Choosing and commitment to act or believe in ability to change.

Self-Reevaluation: Assessing how one feels and thinks about oneself with respect to a problem

Social Liberation: Increasing alternatives for nonproblem behaviors available in society

Stimulus Control: Avoiding stimuli that elicit problem behaviors; adding stimuli that encourage alternative behaviors

The analysis of the processes of change also identified two second order factors, representing two types of processes, experiential and behavioral(Prochaska et al., 1988). The experiential factors - consciousness raising, dramatic relief, environmental reevaluation, social liberation and self reevaluation - generally involve an experiential restructuring component. The behavioral factors - helping relationship, stimulus control, counterconditioning, reinforcement management and self liberation - involve more specific and observable behaviors. The existence of these ten processes and two secondary factors were cross-validated as they emerged in both the Texas and Rhode Island samples (DiClemente & Prochaska, 1985).

Marcus, Rossi, Selby, Niaura, and Abrams (1992) have developed a processes of change questionnaire for exercise that adapted many of the items from the measure developed for smoking. A 39-item paper and pencil questionnaire was developed, with statements representing each of the ten processes of change. Subjects who were participants in a worksite health promotion project were instructed to think back over the past month and rate the frequency of occurrence of each item on a five-point Likert scale (1=never to 5=repeatedly). As in the smoking cessation research, all ten processes of change were used by the subjects. As well, the processes were found to be organized into two higher order constructs, namely experiential and behavioral factors.

**The Integration of Stages and Processes**

The initial integration of the stages and processes of change was demonstrated by Prochaska and DiClemente(1982) in comparing self changers and therapy changers in smoking cessation. Using retrospective interviews with recent quitters, they showed that the verbal processes of change were used more frequently and considered more important when the decision to take action was being made. The behavioral processes were used more frequently and considered more important once individuals had committed themselves to change and had taken action. Consciousness raising was found to be used most during the Contemplation stage as individuals at this stage were most open to information regarding their problem behavior. In order for individuals to commit themselves to change, a corrective emotional experience was needed and therefore catharsis was found to bridge Contemplation and Action. In Action, individuals applied stimulus control, counter conditioning and contingency control processes in order to change their behavior. Thus, both types of processes were considered important for self changers and therapy changers in behavior change(Prochaska & DiClemente, 1984).

This initial study employed the original five processes of change and did not include the Precontemplation stage nor did it investigate the Maintenance stage. Thus a cross-sectional study of self changers representing all five stages of change was undertaken in an attempt to validate the initial integration of the stages and processes. In this study, Prochaska and DiClemente(1983) classified 866 subjects into Precontemplation, Contemplation, Action, Maintenance, and Relapse stages of change. The Relapse group was an exploratory group in this study. It was found that individuals classified into this category did not represent a separate stage of change, but rather demonstrated characteristics of both the Contemplation and Action stages. The results of this study supported the integration of stages and processes, with certain processes used more frequently in certain stages. Individuals in the Precontemplation stage used eight of the ten processes significantly less than did those in the other stages, suggesting that Precontemplators "process less information about smoking, spend less time reevaluating themselves as smokers, experience fewer emotional reactions to the negative aspects of smoking, and do little to shift their attention or their environment away from smoking"(p.393)

Subjects in the Contemplation stage emphasized consciousness raising, and thus were found to be more open to information regarding smoking. Self-reevaluation appeared to bridge Contemplation and Action. Rather than emotional experiences alone (catharsis) moving people to action as initially thought (Prochaska & DiClemente, 1982), in this study, both cognitive and affective self-reevaluation were involved. This indicated that both an individual's thoughts and emotional reactions spurs him/her to make commitments to change.

In the Action stage, self reevaluation continued to be important suggesting that changes in behavior further affected an individual's sense of self. Self liberation, helping relationships, and reinforcement management were also emphasized in this stage. The importance of self liberation in Action suggests that personal commitment

and autonomy are realized once action is taken (Prochaska & DiClemente, 1983). Individuals in the Action stage rely more on helping relationships for understanding and support. As well, individuals in this stage were found to rely more on self and social reinforcement to support their behavioral changes.

Prochaska & DiClemente(1983) also found that the behavioral change processes of counterconditioning and stimulus control appeared to bridge Action and Maintenance. For individuals in Action, assessing the alternative ways of coping with conditions encouraging relapse was emphasized and this carried over into the Maintenance stage as individuals attempted to maintain their changed behavior. Alterations in the individual's behavior and in the environment were both used to support and maintain changes in the problem behavior. This reinforces the view that Maintenance is a stage of active change, rather than absence of change (Prochaska & DiClemente,1982;1983).

Ahijevych and Wewers (1992) replicated this general pattern of differential use of change processes by stage of change in a study of 190 smokers and ex-smokers selected by random digit telephone dialing. The only difference in their results from those of DiClemente and Prochaska(1983) was that social liberation was used more by all three smoker groups (Precontemplation, Contemplation, Relapsers) than non smoker groups. Ahijevych and Wewers (1992) suggest that this may relate to perceived impingement's upon smokers rights to smoke, reflecting changes in the social environment, for example, policies for smoke free environments, that have increased since the original studies were conducted. This study provided further evidence for the generalizability of the stage x process model as it employed a randomly selected sample reducing the potential biases of past studies that used volunteers as subjects.

DiClemente et al. (1991) also provided support for the integration of stages and processes in a study comparing the Precontemplation, Contemplation, and

Preparation stages of change for smoking behavior. It was found that Contemplation and Preparation subjects were similar in the use of the cognitive/affective processes such as consciousness raising, dramatic relief, and self reevaluation. Precontemplation subjects were found to use these processes less in comparison to the subjects in the two other stages. Contemplation and Precontemplation subjects were more similar in their use of the behavioral processes of stimulus control and counterconditioning. The differences in the use of the self liberation process were graded, increasing from Precontemplation to Contemplation to Preparation. These results indicated that Precontemplation subjects were least involved in employing the change processes, Contemplation subjects were gathering information and evaluating their smoking behavior, and Preparation subjects were the most involved in modifying their smoking behavior.

In addition to the relationship between stages and processes, the ability of the processes to predict change over time using six month follow-up data has also been investigated (DiClemente & Prochaska, 1985; Prochaska et al., 1985). This research has suggested that successful change depends upon the stage of change at which the processes are employed. For example, frequent use of self-reevaluation tends to predict progress for Contemplators, but self changers who continued to reevaluate themselves after taking action were found to be more likely to relapse (Prochaska & DiClemente, 1982). Therefore, self-reevaluation has been found to be a critical activity in which successful use depends upon the stage of change (DiClemente & Prochaska, 1985). Prochaska et al. (1985) also found that the use of helping relationships predicted individual's progress from Action to Maintenance, and predicted further attempts to quit smoking by individuals who had relapsed.

Based upon this research in smoking cessation, several conclusions have been made regarding the integration of stages and processes (Prochaska & Marcus, in press). The processes of change are used less by individuals in the Precontemplation

stage. The experiential processes are used to a similar degree by individuals in the Contemplation and Preparation stages. Use of the experiential processes peaks in the Preparation stage and then declines through Action and Maintenance. Use of the behavioral processes increases from Contemplation to Preparation to Action, peaks in Action, and then declines in Maintenance.

The generalizability of the stage by process model across other problem behaviors was investigated by Prochaska and DiClemente (1985). In their two year longitudinal study of self changers, the processes of change for smoking, weight control, and psychological distress were studied. Separate processes of change questionnaires were created for each behavior. The smoking questionnaire was given at 12 months, weight control at 18 months, and psychological distress at 24 months. Each questionnaire had 50 items which were rated using a 5-point Likert scale format. The responses were compared on six change processes, namely consciousness raising, self liberation, reinforcement management, helping relationships, dramatic relief, and stimulus control. Analysis of the results revealed that the subjects used similar patterns of processes in the Action stage, as the ranks for the frequency of use for the six processes were nearly identical across the three behaviors. Due to a printing error in the psychological distress questionnaire, the Contemplation and Maintenance stages could only be compared for smoking and weight control. In the Contemplation and Maintenance stages, the rank orders for both smoking and weight control also yielded a similar pattern. These results imply similarities among different behaviors in the pattern of application of the processes of change.

Although the rank orders were nearly identical for the three behaviors, the absolute level of use differed. For example, in the Action stage, consciousness raising and self-liberation were used more frequently in weight control than in coping with distress, and used more with distress than in smoking. Helping relationships were used more by those coping with distress than weight control, and stimulus control was

used more in weight control than in distress. In the Contemplation and Maintenance stages, consciousness raising and stimulus control was used more for weight control than for smoking. Together, these results indicate that a distinct pattern of coping activities can be identified across different behaviors. However, some processes are used more for some behaviors than for others.

Marcus, Rossi, Selby, Niaura, and Abrams(1992) investigated the relationship between stages and processes of change for exercise. Their analysis indicated that those in the Precontemplation stage used all ten processes of change less than did subjects in the other stages. Differences between the Contemplation and Preparation stages in the use of the experiential processes, were not significant, but use of these processes tended to peak in the Action stage. Three of the experiential processes, self-reevaluation, environmental reevaluation, and dramatic relief, were used more in the Action stage than in Maintenance.

Use of the behavioral processes increased from the Precontemplation to Action stages. Self-liberation, reinforcement management and counterconditioning were used significantly more in Preparation than inContemplation. As well, differences in the use of all five behavioral processes increased significantly between Preparation and Action. Frequency of use of the behavioral processes did not significantly differ between Action and Maintenance.

**Decision Making**

Decision making has been identified by Janis and Mann(1977) as an important component of behavior modification. Janis and Mann(1977) developed a decision balance sheet, a schema which assists individuals to evaluate the pros and cons of a particular behavior. It is proposed to represent both the cognitive and motivational aspects of decision making(Velicer, DiClemente, Prochaska, & Brandenburg, 1985).

Velicer et al.(1985) investigated the relationship of the decision balance sheet to the stages of change in the Transtheoretical Model for smoking. This study

involved both a between-groups comparison as well as a longitudinal study of the utility of the instrument for predicting behavior change. A Decisional Balance Questionnaire of 24 items representing the four categories suggested by Janis and Mann(1977), namely losses or gains for self, losses or gains for significant others, self approval or self-disapproval, and approval or disapproval of others, was completed during a telephone interview. Both the frequency of use and the importance of the items were rated using a five-point Likert format. Based upon a principal component factor analysis, two components emerged. One was composed of the positive aspects of smoking and the other was composed of the negative aspects. In addition, the pattern of results was nearly identical for the importance and frequency formats. As a result, a single bipolar scale, the pros of smoking and the cons of smoking, and only the importance format was used in subsequent administration and analysis.

The cross-sectional analysis comparing individuals representing the stages of change revealed significant differences between the groups in the way that the pros and cons of smoking were viewed. The Immotives, or individuals in the Precontemplation stage viewed the pros of smoking as outweighing the cons. Contemplators viewed the pros and cons as nearly equal. Recent Quitters, or individuals in the Action stage, and Long-term Quitters, or those in the Maintenance stage, viewed the cons as outweighing the pros.

The longitudinal analysis revealed that for those in the Precontemplation and Contemplation stages, the decision balance sheet predicted future smoking behavior six months after the questionnaire was administered. A pro score higher than a con score predicted movement from the Contemplation group to the Immotive group. An equal pro and con score predicted no movement from Contemplation. A con score greater than a pro score predicted movement into the Action stage. The pro and con scales were not useful as predictors for future behavior for the Recent Quitters and Long-term Quitters. As these two groups had quit smoking, both the cross-sectional

and longitudinal data suggested that once the decision to quit is made, other variables are important for the maintenance of the change in behavior(Velicer et al., 1985).

The relationship between the Decision Balance Sheet (Janis & Mann, 1977) and the stages of change was also investigated by DiClemente et al.(1991). In this study, a cross-sectional comparison between groups representing the Precontemplation, Contemplation, and Preparation stages was made. The importance of the positive aspects of smoking decreased significantly from Precontemplation to Contemplation to Preparation, and the reverse pattern emerged for the importance of the negative aspects. The pros of smoking outweighed the cons for the Precontemplators, were similar for the Contemplators, and the cons outweighed the pros for those in the Preparation stage.

A study of the relationship between the Decision Balance Sheet and the stages of change was also conducted in the area of weight control (O'Connell and Velicer, 1988). A 20-item decision balance measure was used consisting of ten pro and ten con items in the decision to lose weight. The results of the study revealed a pattern similar to those identified in the study of smoking cessation(Velicer et al., 1985). The Precontemplators lack of involvement in the change process was demonstrated by their rating of both the pros and cons as unimportant and the cons(against change) rating higher than the pros(for change). For Contemplators, the pros and cons were nearly in balance and were considered to be more important than they were for the Precontemplators. For the Action group, the pros were rated higher than the cons, with the difference between these scores being greater than for any other group. The pros were also rated higher than the cons for the Maintenance group.

The relationship between the Decision Balance Sheet and the stages of change has also been investigated in the area of exercise(Marcus, Eaton, Rossi & Harlow, in press; Marcus & Owen, 1992,; Marcus, Rakowksi & Rossi, 1992). In a cross-sectional analysis, Marcus, Rakowski, & Rossi (1992) compared six con and ten pro

items from a Decision Balance Questionnaire developed for exercise, to the stages of change. The results showed that the pro scores were significantly higher for individuals in Maintenance and Action compared to Precontemplation and Contemplation, in Action compared to Preparation , and in Preparation and Contemplation compared to Precontemplation. Con scores were significantly lower for all stages in comparison to Contemplation, in Maintenance compared to Action, Preparation, and Precontemplation, and in Action compared to Preparation.

Marcus, Eaton, Rossi, & Harlow(in press) and Marcus and Owen(1992) employed a six-item decision balance measure modified to describe exercise behavior from the scale used in smoking cessation (Velicer et al., 1985). The three items on the pro scale indicated perceptions of benefits from exercise and the three con items represented costs of exercise. A five-point Likert scale was used to rate the importance of each item. In both cross sectional (Marcus, Eaton, Rossi, & Harlow, in press; Marcus & Owen, 1992) and longitudinal analysis(Marcus, Eaton, Rossi, & Harlow, in press), the pros and cons were found to be related to the stage of change in a theoretically consistent manner that was similar to the areas of smoking cessation and weight control.

**Self - Efficacy**

The relationship between self-efficacy and stages of change has also been investigated. DiClemente, Prochaska, & Gibertini(1985) developed a 31-item self-efficacy measure for smoking. The items representing a variety of situations were rated on two Likert scales. One scale measured an individual's confidence level in being able to avoid smoking and the other measured how tempted to smoke an individual was. The cross-sectional analysis showed that both confidence and temptation scores differed significantly between smokers and nonsmokers, and recent quitters and long-term quitters. Individuals in the Precontemplation stage had low self-efficacy and high temptation scores. In the Contemplation and Preparation

stages, the differences between confidence and temptation scores narrowed. In Action, efficacy and temptation scores were more in balance, whereas in Maintenance, temptation was rated low and efficacy high (DiClemente, Prochaska, & Gibertini, 1985; DiClemente et al., 1991).

In their longitudinal analysis of a 3-5 month follow-up, DiClemente, Prochaska, & Gibertini(1985) demonstrated the predictive utility of self-efficacy. Subjects with higher self-efficacy scores in the Contemplation and Action stages tended to initiate and maintain a non-smoking status as compared to individuals with low self-efficacy in these stages. The longitudinal self-efficacy analysis was not performed with Precontemplators and Long-term Quitters as they showed minimal behavior change.

The relationship between self-efficacy and stages of change has also been investigated in the area of exercise. Marcus, Eaton, Rossi, and Harlow(in press) and Marcus & Owen(1992) employed a five item self-efficacy measure. Subjects rated each item using a seven-point scale. In both cross-sectional and longitudinal analyses, the self-efficacy measure was related to stage of change in a manner consistent with that in the area of smoking. Maintainers had the highest efficacy scores while the Precontemplators and Contemplators had the lowest. As well, individuals with higher self-efficacy scores were more likely to participate in physical activity six months after the initial assessment.

**Summary**

The Transtheoretical Model provides additional insight in understanding behavior change. Although the development of the model emerged from research in the area of smoking cessation, evidence indicates that it is applicable to other behaviors, including the adoption and maintenance of exercise. Similar stages of change have been identified in smoking cessation, weight control, psychological distress and exercise, namely Precontemplation, Contemplation, Preparation, Action

and Maintenance. As well, ten processes of change have also been identified across these behaviors. These ten processes include consciousness raising, self-liberation, social liberation, dramatic relief, counterconditioning, environmental reevaluation, reinforcement management, self-reevaluation, stimulus control, and helping relationships. These processes have been found to be organized into experiential and behavioral factors, and have been shown to be used differentially by stage of change across these behaviors in a similar manner.

Several recommendations for further research may be made based upon this review. Firstly, further refinement is needed in the scales used to measure the stages of change for exercise. As suggested by Marcus, Eaton, Rossi, & Harlow (in press), a shortened version of their ladder measure could be used in future studies. Secondly, further research testing the validity of the stages of change for exercise are needed using other measures of physical activity. Currently, only the Seven Day Physical Activity Recall Questionnaire has been used. Thirdly, studies are required to replicate and extend the findings of previous studies so that further generalizations across behaviors can occur. For example, one difference between smoking cessation and exercise indicated in the research to date involves the integration of the processes and stages of change. In exercise, use of the behavioral processes was found not to decline from Action to Maintenance as was the case in smoking cessation. As well, use of the experiential processes peaked in the Action stage in exercise, but in the Preparation stage in smoking. As these differences are based upon several studies conducted in the area of smoking cessation but only one study using the Transtheoretical Model in the area of exercise, further studies using the model in the area of exercise are needed to replicate these differences. This study addresses these recommendations.

# CHAPTER 3

# METHODS AND PROCEDURES

## Design of the Study

This investigation involved a cross-sectional study of the stages and processes of change in the area of physical activity. The differential use of the ten processes of change, by individuals representing the five stages of change, was studied. Comparisons of the processes of change used were made across groups representing the stages of change. As well, demographic information including the subjects' age, gender, work schedule, and employment classification and information regarding the subjects' exercise behavior was collected so that the existence of systematic significant differences between the groups representing the stages of change could be determined.

**(a) Subjects**: The subjects for this study were employees of a large medical institution. A random sample of 800 employees was drawn from an employee list provided by the institution's personnel department. Random selection was used in order to produce a representative sample as each employee on the list had an equal probability of selection. The sample size of 800 was chosen so that sufficient numbers of individuals representing the five stages of exercise behavior change would be obtained in order to conduct the data analysis.

**(b) Instruments:**

*Stages of Change*

Subjects were classified into stages of change using Marcus, Eaton, Rossi, and Harlow's (in press) Stages of Change Questionnaire. This measure's reliability over a two week period has been demonstrated (Kappa index of reliability = .78) (Marcus, Selby, Niaura, & Rossi, in press). The construct validity of this measure for exercise has been established in that it has been related to the processes of change (Marcus,

Rossi, Selby, Niaura, Abrams, 1992), decision making and self efficacy (Marcus & Owen, 1992; Marcus, Rakowski & Rossi, 1992; Marcus, Selby, Niaura & Rossi, 1992; Marcus, Eaton, Rossi & Harlow, in press). As well, Marcus & Simkin (in press) demonstrated the concurrent validity of this measure by its association with the Seven Day Physical Activity Recall Questionnaire.

Marcus, Eaton, Rossi, & Harlow's(in press) Stages of Change Questionnaire classified individuals into the stages of change using an 11-point scale in the shape of a ladder. Respondents were asked to pick the rung of the ladder that most accurately described their current exercise behavior. Each rung was numbered, and five of the rungs had written labels corresponding to the stages of change. Respondents could pick rungs that were not labeled, but were classified into the closest stage for which they met the minimum requirements. In responding to this measure, 68% of the subjects selected one of the five labeled rungs. Based upon this, it was suggested that the ladder could be shortened in future studies. In this study, a shortened version of this questionnaire was used (Appendix A).

*Processes of Change*

The processes of change were assessed using Marcus, Rossi, Selby, Niaura, and Abram's (1992) Processes of Change Questionnaire for exercise (Appendix B) . Items were adapted from the Processes of Change Questionnaire used in smoking cessation (Prochaska et al., 1988). Three doctoral level judges classified the items according to definitions of the processes in order to establish content validity. Some evidence for the cross-validation of this questionnaire was provided in that the means, standard deviations, and alpha coefficients for the ten process of change scales were similar when applied to two separate samples (Table 2).

TABLE 2

Processes of Change: Scale means and internal consistency
(Marcus, Rossi, Selby, Niaura, and Abrams, 1992)

| | *Sample 1(n=540)* | | | *Sample 2(n=561)* | | |
|---|---|---|---|---|---|---|
| Process | Mean | SD | Alpha | Mean | SD | Alpha |
| Consciousness Raising | 2.57 | 0.99 | .84 | 2.57 | 1.00 | .84 |
| Counterconditioning | 2.54 | 1.02 | .82 | 2.60 | 1.08 | .84 |
| Dramatic Relief | 2.32 | 1.02 | .87 | 2.31 | 1.03 | .88 |
| Environmental Reevaluation | 2.30 | 0.93 | .81 | 2.34 | 0.96 | .82 |
| Helping Relationships | 2.29 | 1.06 | .84 | 2.28 | 1.02 | .82 |
| Reinforcement Management | 2.31 | 0.96 | .80 | 2.39 | 1.01 | .82 |
| Self Liberation | 3.01 | 0.95 | .72 | 3.01 | 1.06 | .81 |
| Self Reevaluation | 2.98 | 1.14 | .88 | 2.99 | 1.15 | .89 |
| Social Liberation | 2.54 | 0.87 | .62 | 2.55 | 0.86 | .62 |
| Stimulus Control | 1.85 | 0.74 | .71 | 1.92 | 0.81 | .73 |

**(c) Method and Procedures**

In this study, a questionnaire (Appendix C) assessing the stages of change, processes of change, demographic variables and exercise behavior information, along with a cover letter assuring confidentiality and a brief explanation of the study's purpose (Appendix D), was mailed through the hospital mailing system to all subjects chosen through the random sampling technique . In order to maximize the response rate, a return envelope was included to simplify the process of returning the questionnaires by mail. In addition, a follow-up letter (Appendix E) was mailed two weeks after the questionnaire was distributed in order to thank early responders and to remind non-responders to return the questionnaire. Subsequently, data analysis was conducted on all returned questionnaires.

# CHAPTER 4

# RESULTS AND DISCUSSION

## Response Rate

Of the 800 questionnaires that were mailed to the employees, 474 were returned. Of these, 67 were returned as the subjects were unreachable and 407 were used for the data analysis. The response rate was calculated using the following formula (de Vaus, 1990, p.99):

$$\text{Response Rate} = \frac{\text{Number Returned}}{\text{N in sample - (Ineligible x Unreachable)}} \times 100$$

Based upon this formula, the response rate for this study was 56%. This response rate is similar to the typical response rates obtained for mail questionnaire studies (de Vaus, 1990).

## Demographic Profile of Participants

The majority of the subjects in this study were female (n 'female'=340, 83.5% vs n 'male'=66, 16.2%). The mean age of respondents was 46.5 years (sd=7.74). The respondents ranged in age from 25 years to 65 years, with the middle 50% of subjects, or those falling between the 25th and 75th percentiles, being between 40 and 52 years.

In terms of occupational classification, the respondents consisted of 9.1% (n=37) General Support, 9.3% (n=38) Clerical Support, 21.6% (n=88) Paramedical Technical/Professional, 47.4% (n=193) Nurses, 6.1% (n=25) Management, .5% (n=2) Physicians, and 5.2% (n=21) unclassifiable. Physicians were underrepresented in this sample as the personnel list from which the sample was drawn included few physicians. Approximately three-quarters of the sample were employed full-time (n=295, 72.5%), 21.9% (n=89) were employed part-time, and 5.7% (n=23) worked on a relief basis in which they worked only when extra help was needed and they were called in to assist. In terms of work schedules, 33.7% (n=137) worked days, 22.1%

(n=90) worked evenings, 17.9% (n=73) worked nights, and 10.6% (n=43) worked on a rotating schedule basis. In terms of length of work schedules, 39.6% (n=161) worked for 8 hour durations, 2.9% (n=12) worked 10 hour durations, 18.7% (n=76) worked 12 hour durations, and 2% (n=8) of the sample's work schedules were of other lengths in duration. Of the total sample, 41.8% (n=170) reported working shifts. Information regarding the demographic profile from which the sample was drawn was unavailable from the organization, therefore the extent to which the subjects used for this data analysis was representative of the population is unkown.

Subjects were classified into one of the five stages of change, namely Precontemplation (n=32, 7.9%), Contemplation (n=48, 11.8%), Preparation (n=190, 46.7%), Action (n=28, 6.9%) and Maintenance (n=102, 25.1%). The percentage of individuals classified in Action and Maintenance stages of change for exercise in this study (Action=6.9% and Maintenance=25.1%) was similar to that reported by Marcus et al. (1992) in which 10.6% of the subjects were classified into Action and 22% were classified into Maintenance. However, the distribution of subjects in Precontemplation, Contemplation, and Preparation differed. In the study conducted by Marcus et al. (1992), 24.4% of the subjects, compared to 7.9% of subjects in this study, were classified in Precontemplation, 33.4% of the subjects, compared to 11.8% in this study, were classified in Contemplation, and 9.5% of the subjects, compared to 46.7% in this study, were classified in Preparation. Therefore, the percentage of individuals classified in the inactive stages (Precontemplation and Contemplation) was greater in the study conducted by Marcus et al. (1992) than in the present study, whereas the percentage of individuals who were active on an irregular basis was greater in the present study.

These differences may be attributed to several factors. Firstly, the study conducted by Marcus et al. (1992) was conducted in worksites where the workforce was largely blue collar (approximately 88%), and the present study was conducted at

a worksite where the workforce was largely white collar (approximately 75%). Studies (Stephens et al., 1985; Oldrige & Jones, 1983) have reported that blue collar employees tend to be less active and are more likely to drop out of exercise programs than white collar employees. Thus one would expect a larger percentage of inactive individuals in worksites that are predominantly comprised of blue collar employees. Secondly, in the study conducted by Marcus et al. (1992), the subjects also received a questionnaire that was accompanied by a cover letter, but the cover letter requesting their participation in the study was from the company's chief executive officer, and in return for their participation, all respondents were eligible for a $100 prize. These types of incentives for responding were not included in this study, therefore the less active individuals, who may not be as interested in the topic of the survey as those who are active, may be less likely to respond. Thirdly, the subjects of this study were employed in a health care institution and the majority of the subjects were health care workers, whereas the subjects in the study conducted by Marcus et al. (1992) were employed in an industrial manufacturer. As a result of the nature of the workforce, the subjects in this study may have been more attuned to health behaviors than those in the study conducted by Marcus et al. (1992).

Only seven individuals (1.7%) were unable to be classified into one of the five stages of change. In terms of the number of unclassifiable respondents, the revised version of the stages of change scale used in this study appears to be better than the scale used by Marcus et al. (1992) whereby 7% of the sample was unable to be classified into one of the stages of change.

Chi square analysis was used in order to determine the existence of a relationship between the demographic variables and the categories of the stages of change. Based upon the results from this analysis, no significant relationship was found between stage of change and gender ($\chi^2$ =2.92, p=.57), those who do and do not work full-time ($\chi^2$ =4.33,p=.36), part-time ($\chi^2$ =4.39, p=.36), relief ($\chi^2$ =4.09,

p=.39), shiftwork ($\chi^2$ =2.61, p=.63), days ($\chi^2$ =2.39, p=.67), evenings ($\chi^2$ =2.51, p=.64), nights ($\chi^2$ =2.31, p=.68), or rotating schedules ($\chi^2$ =8.04, p=.09). Both duration of work schedule and occupational categories were recoded in order to conduct the chi square analysis. Results from the analysis indicate that no relationship existed between stage of change and those who work eight hour shifts and those who work ten or twelve hour shifts ($\chi^2$ =4.64, p=.33). As a result, one can conclude that stages of change and these variables were not significantly related.

Based upon Chi square analysis, a relationship was found to exist between occupational category and stage of change. The occupation categories were recoded so that general support and clerical support were combined into one category entitled "support". The other categories that were included in the analysis were nurses, paramedical technical/professional, and management. Those who were originally categorized as physician (n=2) and who were unclassifiable (n=21) were excluded from this analysis as their low frequency counts across the stages of change were unsuitable for conducting the Chi square analysis. Results of the chi square analysis (Table 3) revealed that the null hypothesis that occupational categories and stage of change were independent could be rejected ($\chi^2$ =32.55, p<.001). No obvious relationship between stage of change and occupational category is evident in examination of Table 3, however, it appears that nurses tend to be active more on an irregular than regular basis, whereas support personnel, paramedical technicians/ professionals and management tend to be either inactive or regularly active.

The mean age of individuals classified in the five stages were: Precontemplation 48.5 years; Contemplation 45.3 years; Preparation 46.9 years; Action 45.4 years; and Maintenance 46.1 years. ANOVA was used to determine if significant differences in age existed between individuals representing the five stages of change. Based upon this analysis, no two groups were found to be significantly different at the .05 level (Table 4). One can conclude that the differences in the ages

between the groups representing the five stages of change can be accounted for by the variation resulting from random sampling rather than due to any systematic differences between the groups.

TABLE 3
Chi Square Crosstabulation: Stage of Change and Occupation Category

*Stage of Change*

| *Occupation Category* | PC | C | P | A | M | ROW TOTAL |
|---|---|---|---|---|---|---|
| Support | 7 *(Count)*<br>5.5 *(Expected Value)*<br>1.5 *(Residual)* | 14<br>9.4<br>4.5 | 25<br>34.4<br>-9.4 | 8<br>5.5<br>2.5 | 19<br>18.3<br>.7 | 73<br>19.5% |
| Paramedical Technical/ Professional | 7<br>6.5<br>.5 | 13<br>11.2<br>1.8 | 35<br>40.9<br>-5.9 | 4<br>6.5<br>-2.5 | 28<br>21.9<br>6.1 | 87<br>23.3% |
| Nurse | 14<br>14.1<br>-.1 | 14<br>24.3<br>-10.3 | 107<br>88.9<br>18.1 | 11<br>14.1<br>-3.1 | 43<br>47.5<br>-4.5 | 189<br>50.5% |
| Management | 0<br>1.9<br>-1.9 | 7<br>3.2<br>3.8 | 9<br>11.8<br>-2.8 | 5<br>1.9<br>3.1 | 4<br>6.3<br>-2.3 | 25<br>6.7% |
| COLUMN TOTAL | 28<br>7.5% | 48<br>12.8% | 176<br>47.1% | 28<br>7.5% | 94<br>25.1% | 374<br>100.0% |

TABLE 4
Oneway Analysis of Variance of the Differences in Age Across Stage of Change

| Source | D.F. | Sum of Squares | Mean Squares | F Ratio | F Prob. |
|---|---|---|---|---|---|
| Between Groups | 4 | 238.65 | 59.66 | .9964 | .4095 |
| Within Groups | 344 | 20598.48 | 59.88 | | |
| Total | 348 | 20837.13 | | | |

**Processes of Change**

In order to determine the existence of differences in the frequency of use for each of the ten processes of change by individuals in each of the five stages of change, univariate analysis of variance and Tukey Tests were conducted for each of the ten processes of change. Processes of change means, standard deviations, ANOVA and Tukey Test results are presented in Table 5. Detailed ANOVA results are presented in Tables 9 to 18 in Appendix F.

TABLE 5
Process of Change Means, Standard Deviations, ANOVA and Tukey Test Results

| | PC | C | P | A | M | F (Obs.) | Prob. |
|---|---|---|---|---|---|---|---|
| CR | 1.75 a (.59) | 2.44 b (.87) | 2.63 b (.84 ) | 2.83 bc (.88) | 3.04 c (1.06) | 14.52 | <.001 |
| CC | 1.87 a (.71) | 1.96 a (.64) | 2.73 b (.71) | 3.57 c (.83) | 3.83 c (.73) | 89.14 | <.001 |
| DR | 1.72 a (.87) | 2.19 ab (.87) | 2.10 bc (.80) | 1.99 ab (.87) | 2.15 ab (1.00) | 2.30 | .05 |
| ER | 2.05 a (.95) | 2.51 ab (1.01) | 2.57 b (.89) | 2.68 ab (.98) | 2.53 ab (.92) | 2.61 | .03 |
| HR | 1.62 a (.69) | 1.82 a (.78) | 1.94 bc (.83) | 2.19 bc (1.12) | 2.27 b (.97) | 4.91 | <.001 |
| RM | 1.68 a (.78) | 2.24 b (.81) | 2.68 c (.75) | 2.9 cd (.90) | 3.17 d (.91) | 25.38 | <.001 |
| SEL | 2.40 a (.54) | 2.71 a (.83) | 3.25 b (.75) | 3.77 c (.68) | 3.91 c (.72) | 39.99 | <.001 |
| SR | 1.86 a (.75) | 3.07 b (1.10) | 3.04 b (.97) | 3.29 b (.98) | 3.32 b (1.12) | 10.25 | <.001 |
| SOL | 2.52 (.82) | 2.64 (.78) | 2.77 (.76) | 3.04 (.69) | 2.88 (.86) | 2.23 | .06 |
| SC | 1.45 a (.41) | 1.74 a (.66) | 1.96 bc (.67) | 1.87 ac (.60 | 2.17 c (.76) | 7.16 | <.001 |

**Similar subscripts denote stages that are not signficantly different at the .05 level , as a result of Tukey Tests, in frequency of use of the process of change.*
**Different subscripts denote stages that are significantly different*

These results indicate that the processes of change are used differentially by those at the various stages of change, and that the differences in the use of each of the processes of change, with the exception of social liberation, are significantly greater than that which would be expected by chance alone.

In order to illustrate the differential use of the processes of change by individuals representing the various stages of change, the frequency of use for each of the processes of change across the five stages of change are presented in Figures 1 and 2.

**Figure 1**
**Frequency of Use of Experiential Processes of Change by Stage of Change**

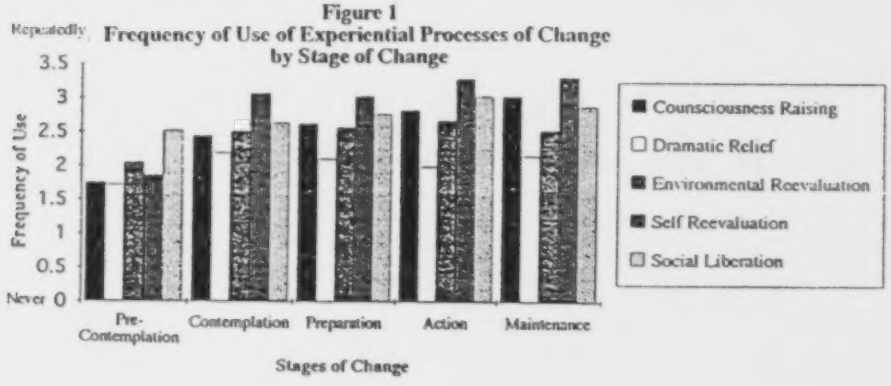
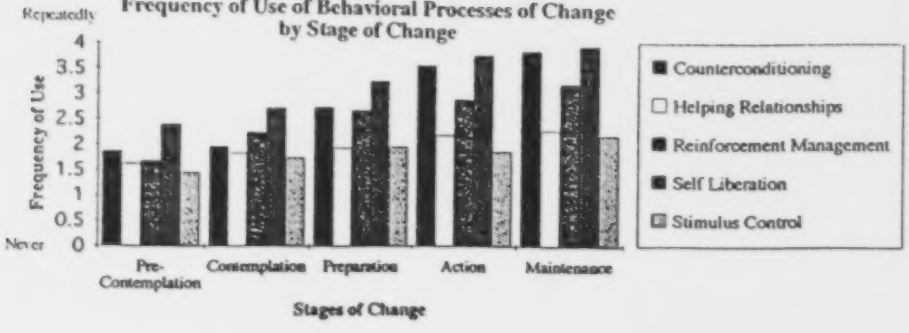



**Figure 2**
**Frequency of Use of Behavioral Processes of Change by Stage of Change**



Based upon the comparison of the frequencies of use of each of the processes of change via analyses of variance, and follow-up comparisons using Tukey Tests, several conclusions may be made regarding the use of the processes of change for individuals in each of the five stages of change.

Similar to the study conducted by Marcus et al. (1992), Precontemplators used the ten processes of change less often than subjects in the other four stages of change. As well, Contemplators used each of the ten processes of change more often than Precontemplators. In contrast to Marcus et al.'s (1992) study wherein no significant differences in the use of any of the processes of change were found between Precontemplators and Contemplators, in the present study, the difference in use was significant between these two stages of change for three of the processes, namely, consciousness raising, reinforcement management, and self reevaluation.

For subjects in Contemplation, Preparation, Action and Maintenance, different patterns of use of the processes of change emerged for the experiential and behavioral processes. The finding by Marcus et al. (1992) that the use of the behavioral processes of change tended to increase from Precontemplation to Action was replicated by the present study. In both the present study and the study conducted by Marcus et al. (1992), use of counterconditioning, reinforcement management, and self liberation was significantly greater in Preparation than in Contemplation. In addition, the use of counterconditioning and self liberation in this study was significantly greater in Action than in Preparation.

In the study conducted by Marcus et al. (1992), use of counterconditioning and reinforcement management continued to increase from Action and into Maintenance, whereas use of the other behavioral processes, namely helping relationships, self liberation, and stimulus control tended to level off in Maintenance. In this study, use of the behavioral processes continued to increase from Action to Maintenance, although these differences were not significant. Marcus et al. (1992)

also reported no significant differences in the use of the behavioral processes between those in Action and those in Maintenance.

Use of the experiential processes, namely consciousness raising, dramatic relief, environmental reevaluation, self reevaluation, and social liberation, tended to increase from Contemplation to Preparation to Action, although these differences were not significant. Use of three of the five experiential processes - environmental reevaluation, self reevaluation, and social liberation - peaked in the Action stage. This result is similar to that found by Marcus et al. (1992), however in their study, use of dramatic relief and consciousness raising, the other two experiential processes, also peaked in the Action stage. In this study, consciousness raising increased from Action ($\bar{x}$ =2.83) to Maintenance($\bar{x}$ =3.04), whereas use of dramatic relief decreased from Preparation ($\bar{x}$ =2.10) to Action ($\bar{x}$ =1.99) and then increased in Maintenance ($\bar{x}$ =2.15). These differences may be attributed to the variation in the general population, or may be explained by the different nature of the subjects in this study who were largely health care workers. Health care workers, or individuals working within a health care institution, may be more informed, interested in, and aware of the health related aspects of participation in physical activity. Therefore, use of consciousness raising may be important to these types of individuals in maintaining involvement in physical activity. Not only may these individuals be interested in the information, but the information is also readily available to them through the promotional efforts available within the institution that address the health benefits of physical activity. Therefore, the combination of their interest in the topic and the availability of the information may be reasons why the use of consciousness raising continued to increase from beyond the Action stage and into the Maintenance stage in this study.

The pattern of use of dramatic relief in this study also differed from that found by Marcus et al. (1992). In the present study, the use of this process increased from

Precontemplation to Contemplation, but then tended to plateau and be used with similar frequency throughout the other stages of change (See Figure 1). This finding may again be attributed to the nature of the subjects of this study. Individuals working within a health care institution are faced daily with serious illnesses and must protect themselves from the human tragedies that continually confront them. As a result, health care workers are expected to supress and intellectualize their emotional reactions. (Scott & Hawk, 1986). Therefore, these types of individuals may not react as emotionally to warnings about the health hazards of inactivity.

Examination of Table 5 also provides information regarding the frequency of use of the processes of change by individuals in each stage of change. Although these comparisons provide some evidence of the frequency of use of the processes of change by those in each of the stages of change, these comparisons must be interpreted cautiously. Statistical tests were not conducted across the processes of change due to the idiosyncracy of items measuring each of the processes of change. It is quite possible that a revision of the particular wording of the items for the individual scales might substantially alter the relative scoring of the scales. By looking at the patterns of the ten scales across the five stages, however, it is possible to gain some insight as to whether a low score was unique to a particular stage of change or seemed to be a more stable factor across stages which might indicate a measurement effect.

In Precontemplation, most of the processes were used infrequently, with scale means ranging from 1.45 to 2.52. Self liberation and social liberation were used more frequently than the other processes of change by individuals in this stage. This suggests that even though individuals in Precontemplation may believe that they can choose to change their behavior and are able to do it, and that they are aware that the adoption of exercise is an acceptable lifestyle behavior, they still do not intend to change their behavior.

In Contemplation, consciousness raising, environmental reevaluation, self liberation, self reevaluation and social liberation tended to be used more frequently than the other processes of change. This suggests that receiving information about physical activity, choosing and accepting an active lifestyle, assessing one's values about adopting physical activity and how the adoption of an active lifestyle will influence one's social and physical environment are common processes used by those who do not currently participate in exercise, but intend to do so in the near future.

In Preparation, dramatic relief, helping relationships, and stimulus control were used less frequently than the other processes of change and continued to be used less frequently than the other processes in Action and Maintenance. This suggests that for individuals who are active on both a regular and irregular basis, relief from the negative affect associated with a sedentary lifestyle, utilizing the support of others, and controlling and altering situations that promote inactivity may not be as important as the other processes.

In Action and in Maintenance, counterconditioning and self liberation were used more frequently than the other processes. This suggests that for those who are active on a regular basis, changing one's thoughts about sedentary behaviors, and one's belief, ability, and commitment to be and remain active, are especially important.

Based upon the results of this study, it can be concluded that use of the processes of change are related to the subjects' stage of change. Precontemplation appears to be the least active stage of change as individuals at this stage use each of the ten processes of change less than individuals at the other stages of change. Individuals in the Contemplation stage use both the experiential and behavioral processes more than those in Precontemplation. This finding provides further evidence that those in Contemplation are more active in thinking about exercise and planning to begin participation in physical activity. This study found that in

particular, consciousness raising, reinforcement management, and self reevaluation are used significantly more in Contemplation than in Precontemplation. These results suggest that in order to assist individuals in developing the intention to become physically active, providing information regarding the outcomes of both sedentary and active lifestyles, helping individuals become aware of the defenses they use against adopting an active lifestyle, assisting individuals in assessing how they perceive themselves with respect to involvement in physical activity, and providing reinforcement to individuals for considering the adoption of physical activity are important.

Use of both the behavioral and experiential processes of change also tended to increase from Contemplation to Preparation. The original study (Marcus et al., 1992) investigating the differential use of the processes of change by those in various stages of change reported that those in Preparation used the behavioral processes of counterconditioning, reinforcement management and self liberation significantly more than those in Contemplation whereas no significant differences were found in the use of the experiential processes. The present study replicated this finding. This suggests that although the use of all of the processes of change increases and thus are important in adopting physical activity, the present study's results suggest that in adopting physical activity, receiving reinforcement for attempts to adopt physical activity, changing the way one thinks and feels about sedentary behaviors, believing in one's ability to be physically active, choosing to adopt physical activity and being committed to this choice are especially important. This study found that use of the experiential and behavioral processes tended to continue to increase into the Action stage. In particular, the results of this study indicate that the behavioral processes of counterconditioning and self liberation are not only important in adopting physical activity, but continue to be important in adopting physical activity on a regular basis as these processes were used significantly more in Action than in Preparation.

The results of this study regarding the differential use of the processes of change depending upon an individuals' stage of change in the exercise acquisition process is similar to those found in smoking cessation in several ways (DiClemente et al, 1991; Prochaska et al., 1991; Prochaska & DiClemente, 1983)). In both exercise and smoking behaviors, the processes of change are used less by those in Precontemplation, and there is little difference between those in Contemplation and Preparation in the use of the experiential processes. As well, for both behaviors, use of the behavioral processes tends to increase from Contemplation to Preparation to Action.

The present study found that subjects in the Maintenance stage tended to use the experiential processes less and the behavioral processes more than did those in the Action stage, although none of the differences in the use of the processes of change were significant between Action and Maintenance. This finding replicates an important difference reported by Marcus et al. (1992) between exercise acquisition and smoking cessation. In smoking cessation, use of the behavioral processes tends to decline as individuals progress from Action to Maintenance, but this decrease tends not to occur in exercise. This suggests that maintaining regular involvement in physical activity is a more active process. As well, another difference between exercise acquisition and smoking cessation that was reported by Marcus et al. (1992) and that the present study replicated is with regards to the use of the experiential processes of change. In smoking cessation, use of the experiential processes peaks in the Preparation stage and then declines in the Action and Maintenance stages (DiClemente et al, 1991; Prochaska et al., 1991; Prochaska & DiClemente, 1983). For exercise, use of the experiential processes tends to increase beyond the Preparation stage and peak in the Action stage.

**Self-Reported Physical Activity**

The purpose of the study was to assess factors associated with involvement in physical activity . No standard definition of exercise was included on the survey that was distributed to the subjects, leaving each subject to define the term "exercise" him/herself. Therefore, the exact nature of the "exercise" that the subjects were involved in is unknown. Information regarding several aspects of involvement in physical activity was collected as part of this study in order to further categorize individuals into groups of relatively more or less activity, to determine the type of physical location in which activity took place, and to test the validity of the stages of change measure used in this study.

The frequency, intensity, and duration of activity were measured by the statements: "On average, what is the average length of your exercise sessions?"; "On average, what is the intensity of your exercise?"; and "What is the average length of your exercise sessions?".

**Frequency of Activity**

In terms of self-reported frequency of activity, 17.9% (n=73) reported that they did not participate in physical activity, 36.9% (n=150) participated one to two times per week, 36.4% (n=148) participated three to five times per week, 6.4% (n=26) participated six or seven times per week, 1.2% (n=5) participated eight or more times per week, and 1.2% (n=5) could not be classified. The existence of a relationship between frequency of exercise and stage of change was tested using chi square analysis. Due to the lower number of individuals within the higher frequency of activity levels, individuals who reported participating in exercise three or more times per week were grouped together for this analysis. A relationship was found to exist between stage of change and frequency of activity ($\chi^2$ =392.31, p<.001). This provides further evidence for the validation of the shortened version of the stages of change scale used in this study.

TABLE 6
Crosstabulation: Frequency of Exercise and Stage of Change

| *Count*<br>*Column*<br>*Percent* | PC | C | P | A | M | ROW TOTAL |
|---|---|---|---|---|---|---|
| Do Not Exercise | 23<br>74.2% | 37<br>77.1% | 12<br>6.4% | | | 72<br>18.2% |
| 1-2 Times Per Week | 6<br>19.4% | 10<br>20.8% | 122<br>65.2% | 6<br>21.4% | 3<br>2.9% | 147<br>37.1% |
| 3 or More Times Per Week | 2<br>36.4% | 1<br>2.1% | 53<br>28.4% | 22<br>78.5% | 99<br>97.1%% | 148<br>36.9% |
| COLUMN TOTAL | 31<br>7.8% | 48<br>12.1% | 187<br>47.2% | 28<br>7.1% | 102<br>25.8% | 396<br>100 % |

**Intensity of Activity**

In terms of self-reported intensity of activity, 17.2% (n=70) indicated no current participation in exercise, 34.9% (n=142) reported participating in "light" exercise (defined by a slight increase in breathing), 42% (n=171) participated in moderate exercise (defined as breathing heavily but still able to carry on a conversation and the onset of sweating), 3.9% (n=16) participated in vigorous exercise (breathing heavy so its difficult to carry on a conversation and begin to fatigue), and 2% (n=8) were unable to be classified.

The existence of a relationship between intensity of activity and stage of change was also investigated using chi square analysis. The higher intensity categories were combined into a moderate-vigorous category for this analysis due to the low number of individuals reporting participation in vigorous activity. The results of this analysis are presented in Table 7. A significant $\chi^2$ of 300.52 ($p<.001$) was obtained, indicating that a relationship between intensity and stage of change exists. In examining the cross classification table values, a trend is evident that indicates that intensity of activity increases with movement through the stages of change. Most of those in Precontemplation (77.4%) and Contemplation(72.9%) reported no

participation in exercise, most of those in Preparation (54.3%) indicated participation in "light" exercise, and most of those in Action (88.9%) and Maintenance(84.2%) reported participation in "moderate-vigorous" activity.

TABLE 7
Crosstabulation: Intensity of Exercise and Stage of Change

| *Count*<br>*Column*<br>*Percent* | PC | C | P | A | M | ROW TOTAL |
|---|---|---|---|---|---|---|
| Do Not Exercise | 24<br>77.4% | 35<br>72.9% | 10<br>5.4% | | | 69<br>17.6% |
| Light | 7<br>22.6% | 13<br>27.1% | 101<br>54.3% | 3<br>11.1% | 16<br>15.8% | 140<br>35.6% |
| Moderate/ Vigorous | | | 75<br>40.3% | 24<br>88.9% | 85<br>84.2% | 184<br>46.8% |
| COLUMN TOTAL | 31<br>1.9% | 48<br>12.2% | 186<br>47.3% | 27<br>6.9% | 101<br>25.7% | 393<br>100.0% |

**Duration of Activity**

Self reported duration of activity was also investigated. Of the entire sample, 16.5% (n=67) reported no current participation in exercise, 22.4% (n=91) reported the average length of their exercise sessions as less than twenty minutes, 40.8% (n=166) exercised between twenty and forty minutes on average, 19.2% (n=78) exercised more than forty minutes on average, and 1.2% (n=5) could not be classified. Chi square analysis indicated that a significant relationship exists between duration of exercise and stage of change ($\chi^2$ =308.06, p<.001). The distribution of subjects in terms of duration of exercise and stage of change demonstrates that duration of exercise increases across the stages of change (Table 8).

TABLE 8
Crosstabulation: Duration of Exercise and Stage of Change

| *Count*<br>*Column*<br>*Percent* | PC | C | P | A | M | ROW TOTAL |
|---|---|---|---|---|---|---|
| Do Not Exercise | 23<br>76.7%23<br>74.2% | 34<br>72.3% | | | | 66<br>16.7% |
| < 20 Minutes | 4<br>13.3% | 11<br>23.4% | 70<br>37.0% | | | 90<br>22.7% |
| 20-40 Minutes | 1<br>3.3% | 2<br>4.3% | 87<br>46.0% | 15<br>53.6% | 59<br>57.8% | 164<br>41.4% |
| > 40 Minutes | 2<br>6.7% | | 23<br>12.2% | 13<br>46.4% | 38<br>37.3% | 76<br>19.2% |
| COLUMN TOTAL | 30<br>7.6% | 47<br>11.9% | 189<br>47.7% | 28<br>7.1% | 102<br>25.8% | 396<br>100 % |

These measures provide further information regarding the activity patterns of individuals categorized in the five stages of change. Marcus and Simkin (in press) reported that one's reported stage of change was consistent with self-reported physical activity on a seven-day recall. The relationship between frequency, intensity, and duration of activity and stage of change in this study further supports the validity of the stage of change measure.

Other self-reported physical activity measures in this study attempted to address whether employees of the medical institution were aware of the existence of the staff fitness and recreation centre within the institution and to determine the number of employees who, in exercising, used this facility and its programs, or who used other facilities and programs. The majority of the subjects (96.8%, n=394) were aware of the existence of the staff fitness and recreation centre within the institution. Despite the large number of individuals' awareness of the centre, only 14% (n=57) used the facility and its programs. This percentage of employees who used the workplace centre is consistent with research investigating participation in employee fitness programs and facilities at the worksite. Shephard (1988) reported that "no

more than 20% of eligible workers are usually recruited to a corporate fitness programs" (p.305). The present study also found that 18.2% (n=74) of the subjects were members of, or participated in, programs offered by other fitness and recreation facilities. Of these, 2.2% (n=9) used both the worksite and other facilities and programs. Based upon these results, it can be concluded that a slightly greater number of individuals at this medical institution reported using facilities outside of the workplace than the programs and facilities available at the worksite.

# CHAPTER 5

# SUMMARY, CONCLUSION AND RECOMMENDATIONS

## Summary and Conclusion

The adoption and maintenance of healthy lifestyle behaviors is a complex process that may be understood as a sequence of stages in which different processes are applied over time (Horn, 1976; Marlatt & Gordon, 1985). The Transtheoretical Model is one stage-based model of change that has been applied in attempts to understand behavior change.

As regular involvement in physical activity has been associated with various physical and psychological benefits(Bouchard et al., 1990), understanding of the factors involved in the adoption and maintenance of an active lifestyle is important. This study attempted to gain further information regarding this processes by investigating the utility of the Transtheoretical Model in understanding the adoption and maintenance of physical activity.

This investigation involved a cross-sectional study of two components of the Transtheoretical Model, the stages and processes of change, in the area of physical activity. The differential use of the model's ten processes of change, namely consciousness raising, counterconditioning, dramatic relief, environmental reevaluation, helping relationships, reinforcement management, self liberation, self reevaluation, social liberation and stimulus control, among individuals representing the five stages of change, namely Precontemplation, Contemplation, Preparation, Action, and Maintenance, was assessed. 800 employees of a large medical institution were randomly sampled . Subjects were mailed a questionnaire that included the stages of change and processes of change scales (Marcus, Eaton, Rossi & Harlow, in press; Marcus, Rossi, Selby, Niaura, & Abrams, 1992) and questions assessing demographic variables and exercise behavior.

Subjects (n=407) were classified into one of five stages of change, namely Precontemplation (n=32, 7.9%), Contemplation (n=48, 11.8%), Preparation (n-190, 46.7%), Action (n=28, 6.9%) and Maintenance (n=102, 25.1%). The present study demonstrated that consideration of the stages and processes of change is useful in understanding exercise behavior. Approximately 20% of this predominantly female, middle-aged, white-collar sample were not currently exercising, 45% were exercising on an irregular basis, and 30% were regularly active. Stage of exercise adoption was not related to gender, age, employment status, or work schedules. Stage of change and occupational category were found to be related. Nurses tended to be active on an irregular basis, whereas support personnel, paramedical technicians/professionals, and management tended to be either inactive or regularly active.

The participants in this study utilized all ten processes of change. The frequency of use of the processes differed depending upon the stage of change of the respondents. These differences were significant for all of the processes except for social liberation.

Precontemplators used self liberation and social liberation more frequently than the other processes of change suggesting that beliefs that one can choose their behavior, that they are able to do the behavior, and they are aware that the adoption of exercise is an acceptable lifestyle practice, is not sufficient to develop the intention to become physically active. In addition, each of the processes of change were used less by individuals in this stage than by subjects in the other stages of change.

The most frequently used processes by those in Contemplation were the experiential processes - consciousness raising, environmental reevaluation, self reevaluation, and social liberation,- and one of the behavioral processes, self liberation, This confirms that many of those in Contemplation, although not yet active, are thinking about beginning an exercise program. Those who are not active but intend to become active in the near future are receiving information about

physical activity, accept an active lifestyle, are assessing their values regarding physical activity, and considering how the adoption of an active lifestyle will affect their social and physical environment. The use of consciousness raising, reinforcement management, and self reevaluation was significantly greater for Contemplators than Precontemplators.

Use of both the experiential and behavioral processes tended to increase from Precontemplation to Contemplation to Preparation to Action. In particular, the behavioral processes of counterconditioning, reinforcement management and self liberation were used significantly more in Preparation than in Contemplation. As well, counterconditioning and self liberation were used significantly more in Action than in Preparation, and were used more frequently than the other processes of change by those in Action and in Maintenance. This suggests that in beginning an exercise program, receiving reinforcement, changing the way that one thinks about and responds to sedentary behaviors, believing that one has the ability to be physically active and being committed to participation in physical activity, are especially important. In addition, assesing how one feels and thinks about being active versus being sedentary, and one's belief in their abilities, continue to be important in the maintenance of regular participation in physical activity. On the other hand, dramatic relief, helping relationships, and stimulus control were used less frequently than the other processes of change by those in Preparation, Action, and Maintenance. This suggests that for the subjects in these stages of change, the other processes may be more important in adopting and maintaining physical activity.

Subjects in the Maintenance stage tended to use the experiential processes less and the behavioral processes more than did those in the Action stage. These differences, however, were not statistically significant for any of the processes. As the behavioral processes continue to be used frequently in the Maintenance stage, the

maintenance of regular physical activity continues to be an active behavior change process rather than the cessation of the change process.

This study replicated important differences regarding the differential use of the processes of change between exercise and smoking cessation reported by Marcus et al. (1992). In the smoking cessation research (Ahijevych & Wewers, 1992; DiClemente et al., 1991), use of the experiential processes peaked in the Preparation stage and then declined in Action and Maintenance. For exercise, use of the experiential processes tends to peak in the Action stage. As well, use of the behavioral processes tends to decline from Action to Maintenance in smoking cessation, but not for exercise. The replication of these differences provides further support for the generalizability of these findings. The differential use of the processes of change in exercise acquisition and maintenance appears to be slightly different than that which occurs in smoking cessation. Whether these differences are unique to exercise, or represent differences between the cessation of a behavior and the acquisition of a behavior requires further investigation. Although the adoption of exercise may be considered the cessation of a sedentary lifestyle (Prochaska & Marcus, in press), research involving other acquisition behaviors is needed in order for further comparisons to be made. Based upon these results, several recommendations may be made.

**Recommendations**

Based upon this research, several recommendations may be made.

(A) The results of this study emphasize the importance of approaching physical activity participation as a dynamic, ongoing process. In order to understand more fully the factors that influence involvement in physical activity, and to design more effective interventions for facilitating and enhancing such involvement, the dynamic and continuous nature of the change process must be taken into consideration.

(B) This study demonstrated that the Transtheoretical Model's stages and processes of change are useful in understanding involvement in physical activity. Replication studies using more diverse samples are needed.

(C) More longitudinal data assessing the predictive utility of the model, in particular longitudinal studies investigating the processes of change, are needed. To date, only six-month follow-ups assessing the predictive utility of the stages of change, the pros and cons of exercise, and self-efficacy, have been reported in the literature.

(D) The development and evaluation of interventions based on the Transtheoretical Model is needed to determine the effectiveness of such an approach, one that addresses the dynamic nature of behavior change, in enhancing the adoption and maintenance of physical activity.

(F) Further instrument development is needed with the Processes of Change Questionnaire so that comparability across scales in terms of frequency of use may be improved.

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## APPENDIX A

### Stages Of Change Questionnaire

Please check the **one** statement that best represents your current exercise behavior.

** Regular exercise is defined as participating in exercise three or more times per week for at least twenty minutes each time.

( ) "I currently do not exercise and I do not intend to start exercising in the next six months."

( ) "I currently do not exercise but I am thinking about starting to exercise in the next six months."

( ) "I currently exercise some but not regularly."

( ) "I currently exercise regularly, but I have only begun doing so within the last six months."

( ) "I currently exercise regularly, and have done so for longer than six months."

## APPENDIX B

### Processes Of Change Questionnaire

The following experiences can affect the exercise habits of some people. Think of any similar experiences you may be currently having or have had during the past month. Then rate how frequently the event occurs. Please check the number that best describes your answer to each experience. How frequently does this occur?

| | Never | | Occasionally | | Repeatedly |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| Consciousness Raising | | | | | |
| I recall information people have personally given me on the benefits of exercise. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I think about information from articles and advertisements on how to make exercise a regular part of my life. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I read articles about exercise in an attempt to learn more about it. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I look for information related to exercise. | ( ) | ( ) | ( ) | ( ) | ( ) |
| Counterconditioning | | | | | |
| Instead of remaining inactive I engage in some physical activity. | ( ) | ( ) | ( ) | ( ) | ( ) |
| Rather than viewing exercise as simply another task to get out of the way, I try to use it as my special time to relax and recover from the day's worries. | ( ) | ( ) | ( ) | ( ) | ( ) |
| When I feel tired, I make myself exercise anyway because I know I will feel better afterward. | ( ) | ( ) | ( ) | ( ) | ( ) |
| When I'm feeling tense, I find exercise a great way to relieve my worries. | ( ) | ( ) | ( ) | ( ) | ( ) |

| Dramatic Relief | Never | | Occasionally | | Repeatedly |
|---|---|---|---|---|---|
| Worrying about health hazards of inactivity moves me emotionally. | ( ) | ( ) | ( ) | ( ) | ( ) |
| Dramatic portrayals of the evils of inactivity move me emotionally. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I react emotionally to warnings about an inactive lifestyle. | ( ) | ( ) | ( ) | ( ) | ( ) |

| Environmental Reevaluation | | | | | |
|---|---|---|---|---|---|
| I feel I would be a better role model for others if I exercised regularly. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I wonder how my inactivity affects those people who are close to me. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I realize that I might be able to influence others to be healthier if I would exercise more. | ( ) | ( ) | ( ) | ( ) | ( ) |
| Some of my close friends might exercise more if I would. | ( ) | ( ) | ( ) | ( ) | ( ) |

| Helping Relationships | | | | | |
|---|---|---|---|---|---|
| I have someone on whom I can depend when I am having problems with exercising. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I have a healthy friend that encourages me to exercise when I don't feel up to it. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I have someone who points out my rationalizations for not exercising. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I have someone who provides feedback about my exercising. | ( ) | ( ) | ( ) | ( ) | ( ) |

| Reinforcement Management | Never | | Occasionally | | Repeatedly |
|---|---|---|---|---|---|
| I reward myself when I exercise. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I try to set realistic goals for myself rather than setting myself up for failure by expecting too much. | ( ) | ( ) | ( ) | ( ) | ( ) |
| When I exercise, I tell myself that I am being good to myself by taking care of my body in this way. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I do something nice for myself for making efforts to exercise more. | ( ) | ( ) | ( ) | ( ) | ( ) |
| **Self-Liberation** | | | | | |
| I tell myself I am able to keep exercising if I want to. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I tell myself that if I try hard enough I can keep exercising. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I make commitments to exercise. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I remind myself that I am the one who is responsible for my health and well-being, and that only I can decide whether or not I will exercise. | ( ) | ( ) | ( ) | ( ) | ( ) |
| **Self-Reevaluation** | | | | | |
| I am considering the idea that regular exercise would make me a healthier, happier person to be around. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I think about the type of person I will be if I keep exercising. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I get frustrated with myself when I don't exercise. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I consider the fact that I would feel more confident in myself if I exercised regularly. | ( ) | ( ) | ( ) | ( ) | ( ) |

| Social Liberation | Never | | Occasionally | | Repeatedly |
|---|---|---|---|---|---|
| I find society changing in ways that make it easier for the exerciser. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I am aware of more and more people encouraging me to exercise these days. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I notice that more businesses are encouraging their employees to exercise by offering fitness courses and time off to work out. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I am aware that many health clubs now provide free babysitting services to their members. | ( ) | ( ) | ( ) | ( ) | ( ) |

| Stimulus Control | | | | | |
|---|---|---|---|---|---|
| I put things around my home to remind me of exercising. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I keep things around my place of work that remind me to exercise. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I remove things that contribute to my inactivity. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I avoid spending long periods of time in environments that promote inactivity. | ( ) | ( ) | ( ) | ( ) | ( ) |

# APPENDIX C

## *EXERCISE BEHAVIOR SURVEY*

1. Please check the **one** statement that best represents your current exercise behavior.

**Regular exercise is defined as participating in exercise three or more times per week for at least twenty minutes each time.

( ) "I currently do not exercise and I do not intend to start exercising in the next six months."

( ) "I currently do not exercise but I am thinking about starting to exercise in the next six months."

( ) "I currently exercise some but not regularly."

( ) "I currently exercise regularly, but I have only begun doing so within the last six months."

( ) "I currently exercise regularly, and have done so for longer than six months."

2. The following experiences can affect the exercise habits of some people. Think of any similar experiences you may be currently having or have had **during the past month**. Then rate how frequently the event occurs. Please check the number that best describes your answer to each experience. **How frequently does this occur?**

| | Never | | Occasionally | | Repeatedly |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| Instead of remaining inactive I engage in some physical activity. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I tell myself I am able to keep exercising if I want to. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I put things around my home to remind me of exercising. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I tell myself that if I try hard enough I can keep exercising. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I recall information people have personally given me on the benefits of exercise. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I make commitments to exercise. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I reward myself when I exercise. | ( ) | ( ) | ( ) | ( ) | ( ) |

| | Never | | Occasionally | | Repeatedly |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| I think about information from articles and advertisements on how to make exercise a regular part of my life. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I keep things around my place of work that remind me to exercise. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I find society changing in ways that make it easier for the exerciser. | ( ) | ( ) | ( ) | ( ) | ( ) |
| Warnings about health hazards of inactivity affect me emotionally. | ( ) | ( ) | ( ) | ( ) | ( ) |
| Dramatic portrayals of the evils of inactivity affect me emotionally. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I react emotionally to warnings about an inactive lifestyle. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I worry that inactivity can be harmful to my body. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I am considering the idea that regular exercise would make me a healthier, happier person to be around. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I have someone on whom I can depend when I am having problems with exercising. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I read articles about exercise in an attempt to learn more about it. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I try to set realistic exercise goals for myself rather than setting myself up for failure by expecting too much. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I have a healthy friend that encourages me to exercise when I don't feel up to it. | ( ) | ( ) | ( ) | ( ) | ( ) |
| When I exercise, I tell myself that I am being good to myself by taking care of my body. | ( ) | ( ) | ( ) | ( ) | ( ) |

| | Never | | Occasionally | | Repeatedly |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| Exercise is my special time to relax and recover from the days worries, not a task to get out of the way. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I am aware of more and more people encouraging me to exercise these days. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I do something nice for myself for making efforts to exercise more. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I have someone who points out my rationalizations for not exercising. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I have someone who provides feedback about my exercising. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I remove things that contribute to my inactivity. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I am the only one responsible for my health and only I can decide whether or not I will exercise. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I look for information related to exercise. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I avoid spending long periods of time in environments that promote inactivity. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I feel I would be a better role model for others if I exercised regularly. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I think about the type of person I will be if I keep exercising. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I notice that more businesses are encouraging their employees to exercise by offering fitness courses and time off to work out. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I wonder how my inactivity affects those people who are close to me. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I realize that I might be able to influence others to be healthier if I would exercise more. | ( ) | ( ) | ( ) | ( ) | ( ) |

| | Never | | Occasionally | | Repeatedly |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| I get frustrated with myself when I don't exercise. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I am aware that many health clubs now provide free babysitting services to their members. | ( ) | ( ) | ( ) | ( ) | ( ) |
| Some of my close friends might exercise more if I would. | ( ) | ( ) | ( ) | ( ) | ( ) |
| I consider the fact that I would feel more confident in myself if I exercised regularly. | ( ) | ( ) | ( ) | ( ) | ( ) |
| When I feel tired, I make myself exercise anyway because I know I will feel better afterward. | ( ) | ( ) | ( ) | ( ) | ( ) |
| When I'm feeling tense, I find exercise a great way to relieve my worries. | ( ) | ( ) | ( ) | ( ) | ( ) |

3. On average, how many times per week do you currently participate in exercise?

( ) I currently do not exercise
( ) 1 2 times per week
( ) 3-5 times per week
( ) 6-7 times per week
( ) 8 or more times per week

4. On average, what is the intensity of your exercise?

( ) I currently do not exercise
( ) Light (slight increase in breathing)
( ) Moderate (breathing heavily but still able to carry on a conversation; onset of sweating)
( ) Vigorous (breathing heavily so that it is difficult to carry on a conversation; begin to feel fatigue)

5. What is the average length of your exercise sessions?

( ) I currently do not exercise
( ) Less than 20 minutes
( ) 20 - 40 minutes
( ) More than 40 minutes

6. Are you aware that the University of Alberta Hospitals has a staff fitness and recreation centre?

( ) Yes ( ) No

7. Are you a member of or participate in the programs offered by the Pulse Generator, the University of Alberta Hospitals' fitness and recreation centre?

( ) Yes ( ) No

8. Are you a member of or participate in the programs offered by other fitness and recreation facilities?

( ) Yes ( ) No

***DEMOGRAPHIC INFORMATION***

GENDER: ( ) Male ( ) Female

AGE: _____

OCCUPATIONAL CLASSIFICATION:

( ) General Support
( ) Clerical Support
( ) Physician
( ) Paramedical Technical Professional
( ) Nursing
( ) Management
( ) Other_____(Please specify)

EMPLOYMENT STATUS:

( ) Full-time
( ) Part-time
( ) Relief

DO YOU WORK SHIFTS? ( ) Yes ( ) No

If Yes, what shifts do you work?

( ) Days
( ) Evenings
( ) Nights
( ) Rotating

If Yes, how long are your shifts?

( ) 8 hours
( ) 10 hours
( ) 12 hours
( ) Other

WOULD YOU LIKE A COPY OF THE RESULTS OF THIS RESEARCH MAILED TO YOU?
( ) Yes ( ) No

*Thank you for participating in this study*

## APPENDIX D

University of Alberta
Edmonton
Canada T6G 2H9

Department of
Physical Education and Sport Studies
P-421 Universiade Pavilion
Van Vliet Physical Education and Recreation Centre

Dear hospital employee;

You have been randomly selected from all hospital staff to participate in a study we are conducting concerning the health behaviors of the employees of the University of Alberta Hospitals. .

We request that you complete the enclosed survey and mail it back to us in the envelope provided. The survey will take approximately ten minutes to complete. A follow-up study will be undertaken in approximately six months in which another survey will be mailed to you to complete. Your participation in this study is voluntary, therefore you may decline to complete the survey or withdraw from the study at any time. However, for us to obtain valid results, it is important that you participate and complete the survey as accurately and completely as possible and return it to us.

Your responses will be kept completely confidential. You have been assigned an identification number that is located on the first page of the survey. Only the investigator will have access to your name and associated identification number. This information will be kept in a locked filing cabinet. The identification number is used only to check whether your survey has been mailed back to us. Your name will never be placed on the survey or used in any aspect of reporting the results of this study.

The overall results of this study will be presented in a Masters Thesis and may be published in a journal or presented at a research conference. As well, a summary report of the results will be provided to the University of Alberta Hospitals Human Resources Department and will also be made available to all participants in this study. If you would like a summary of the results for yourself, please indicate so on the last question of this survey. It is hoped that the results of this study will provide increased knowledge for you in terms of your own exercise behavior as well as provide a greater understanding of the exercise behavior of the Hospitals' employees in general.

If you require further information or have any questions regarding this study, please contact me at 492-5702. Thank you very much for your assistance.

Sincerely,

Leonard M. Wankel, PhD
Professor

## APPENDIX E

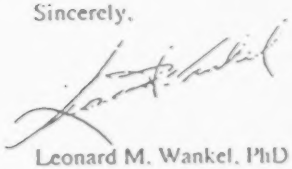
EXERCISE BEHAVIOR STUDY

As part of a study on the health behaviors of the University of Alberta Hospitals employees, a survey regarding your exercise behavior was recently mailed to you.

If you have completed the survey already, please accept our sincere thanks. If not, could you please return it today. It is important that you complete the survey as accurately and completely as possible in order for us to obtain valid results.

If you did not receive the survey or have misplaced it, please call me at 492-5702 and we will send you another copy.

Sincerely,



Leonard M. Wankel, PhD
Professor

## APPENDIX F

Table 9
ANOVA: Consciousness Raising by Stage of Change

| Source | D.F. | Sum of Squares | Mean Squares | F Ratio | F Prob |
|---|---|---|---|---|---|
| Between Groups | 4 | 45.46 | 11.36 | 14.52 | <.001 |
| Within Groups | 389 | 304.44 | .78 | | |
| Total | 393 | 349.90 | | | |

Table 10
ANOVA: Counterconditioning by Stage of Change

| Source | D.F. | Sum of Squares | Mean Squares | F Ratio | F Prob. |
|---|---|---|---|---|---|
| Between Groups | 4 | 184.37 | 46.09 | 89.14 | <.001 |
| Within Groups | 384 | 198.56 | .52 | | |
| Total | 388 | 382.93 | | | |

Table 11
ANOVA: Dramatic Relief by Stage of Change

| Source | D.F. | Sum of Squares | Mean Squares | F Ratio | F Prob. |
|---|---|---|---|---|---|
| Between Groups | 4 | 7.00 | 1.75 | 2.30 | .05 |
| Within Groups | 382 | 290.26 | .76 | | |
| Total | 386 | 297.27 | | | |

Table 12
ANOVA: Environmental Reevaluation by Stage of Change

| Source | D.F. | Sum of Squares | Mean Squares | F Ratio | F Prob. |
|---|---|---|---|---|---|
| Between Groups | 4 | 8.99 | 2.24 | 2.61 | .03 |
| Within Groups | 380 | 327.26 | .86 | | |
| Total | 384 | 336.26 | | | |

Table 13
ANOVA: Helping Relationships by Stage of Change

| Source | D.F. | Sum of Squares | Mean Squares | F Ratio | F Prob. |
|---|---|---|---|---|---|
| Between Groups | 4 | 16.29 | 4.07 | 4.91 | <.001 |
| Within Groups | 388 | 322.08 | .83 | | |
| Total | 392 | 338.38 | | | |

Table 14
ANOVA: Reinforcement Management by Stage of Change

| Source | D.F. | Sum of Squares | Mean Squares | F Ratio | F Prob. |
|---|---|---|---|---|---|
| Between Groups | 4 | 68.9 | 17.23 | 25.38 | <.001 |
| Within Groups | 388 | 263.38 | .67 | | |
| Total | 392 | 332.28 | | | |

Table 15
ANOVA: Self Liberation by Stage of Change

| Source | D.F. | Sum of Squares | Mean Squares | F Ratio | F Prob. |
|---|---|---|---|---|---|
| Between Groups | 4 | 86.55 | 21.63 | 39.99 | <.001 |
| Within Groups | 383 | 207.19 | .54 | | |
| Total | 387 | 293.75 | | | |

Table 16
ANOVA: Self Reevaluation by Stage of Change

| Source | D.F. | Sum of Squares | Mean Squares | F Ratio | F Prob. |
|---|---|---|---|---|---|
| Between Groups | 4 | 43.52 | 10.88 | 10.25 | <.001 |
| Within Groups | 385 | 408.58 | 1.06 | | |
| Total | 389 | 452.11 | | | |

Table 17
ANOVA: Social Liberation by Stage of Change

| Source | D.F. | Sum of Squares | Mean Squares | F Ratio | F Prob. |
|---|---|---|---|---|---|
| Between Groups | 4 | 5.71 | 1.43 | 2.23 | .06 |
| Within Groups | 373 | 239.14 | .64 | | |
| Total | 377 | 244.85 | | | |

Table 18
ANOVA: Stimulus Control by Stage of Change

| Source | D.F. | Sum of Squares | Mean Squares | F Ratio | F Prob. |
|---|---|---|---|---|---|
| Between Groups | 4 | 13.43 | 3.36 | 7.16 | <.001 |
| Within Groups | 376 | 176.31 | .47 | | |
| Total | 380 | 189.74 | | | |